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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLII., No. 2873.] TUESDAY, JUNE 4, 1918. [70TH YEAR.

EDITORIAL NOTES.

Financial Hardships Committee's Deliberations.

We recently expressed the view that the delay in the notification of the decision of Sir William Middlebrook and his colleagues of the Committee who have been inquiring into the financial situation of gas undertakings working during the war under the statutory restrictions established to fit peace-time conditions, was of good augury in view of the terms of the reference to them being in two parts. The first was as to the expediency of making some temporary modification in the statutory requirements with regard to price and dividend, and the second to decide the terms and conditions on which variations should be made. We surmised that, as the first part of the reference would not demand any great deliberation by the Committee, and the second part would, the time the Committee were giving to the consideration of their decision and report pointed to an agreement as to the propriety of temporary relief, but that the terms and conditions were the troublesome matters. The Parliamentary Correspondent of the "Daily Telegraph," in writing last week after another meeting of the Committee, confirmed the surmise, by saying it was understood that they were of opinion that a case had been made out for temporary relief, but they had not then settled the extent to which relief should be granted. The private deliberations of the Committee are being continued this week; and so now their report may be expected at any time. The publication of the intimation by our morning contemporary, following so closely upon the ill-advised letter of Mr. A. L. Leon, the Chairman of the Public Control Committee of the London County Council, to it and other newspapers [*ante*, pp. 371, 386], was a rebuff for him quite apart from the public remonstrances from Mr. D. Milne Watson and other writers. From the fact that Mr. Leon took this means of trying to stir up agitation among gas consumers to get members of Parliament to resist any attempt to give the companies relief, suggests that he had received some inkling as to the intentions of the Committee in regard to the first point of reference. We hope that, at the next meeting of the London County Council, some steps will be taken to dissociate the Council as a body from this attempt to reopen a case and start a new agitation while the very tribunal to whom the Council had submitted their case were deliberating regarding their decision. This sort of action is not as a rule admired by Englishmen. Of this we are confident, that Mr. Leon has done no good to the cause which he has thought right to espouse, through his obvious inability to see that gas capital has a right to justice as well as individuals.

Absence of Universal Interest, and a General Policy.

Not by any means a new subject for the columns of the "Journal," we have heard from more than one quarter lately complaint that the gas industry has not in these times any settled policy regarding the promotion of manufacturing economy; while in the chief competing industry, there is seething interest in the discussion of rival plans to promote generating economy. Though the means of realizing this have not been finally determined, the electrical industry is unanimous on the point that larger concentrations of generating plant are required, and that the smaller and the more uneconomical stations must pass by absorption into the larger ones. This much is agreed. The same line of action might with advantage be taken in the gas industry; but even this would not be enough. The main economy is required from the manufacture of a suitable gas; and over this matter there is a superb listlessness, as though any remote time will do for the consideration of a subject that means if not life or death to the industry, at least advantage or disadvantage to trade competitors, according to their own success in the cheapening of production. The reply from some quarters will be that the Gas Investigation Committee of the Institution of Gas Engineers are at work, that the Board of Fuel Research are moulding plans for investigation, and that passing interest is being taken in steaming charges and mixing straight water gas with well-made coal gas. Also that various important undertakings are pursuing inquiries. This is all very good up to a point. But what is wanted is a universal and not a patchy interest—a universal intention to do something and a universal policy, and not for the major part of the gas undertakings of the kingdom to sit tight upon their haunches waiting for something to turn up, and little caring what that something may be. The gas industry in this matter presents a strange mixture of apathy, indecision, and indiscretion. It has got to revise its notions and its standards. It has been shown more during the war than ever before that the composition and the flame temperature of gas are of more importance than its calorific power; and this fact has to be borne in mind in shaping a policy. Even though matters of gas quality and standards cannot be settled without complete scientific investigation, the industry could well make some attempt to show that the question of putting into the gas-mains of the Kingdom a more economically produced gas is of vital importance to the future development of the industry, and therefore one of concern for every man in it. Those who read "Electric "Supply Memoranda" this week will see that the Institution of Electrical Engineers are preparing a scheme for the formation of an Electrical Cooking and Heating Association. What does this portend? Increased activity at the commercial end. A *sine quâ non* to a larger success than has yet been achieved with electric cooking and heating is cheaper electrical energy; and this, combined with the industrial power business, is the cause of the widespread interest there is in the electrical industry over the various plans, already suggested or in embryo, for reducing the cost of generation. The gas industry has got to wake up. Its commercial rival is busy, while it is regarding this matter in a leisurely fashion as being of no immediate concern. The electricity industry has another advantage. It is being shown in the equipment of national kitchens. Although the secondary products of gas manufacture are so greatly needed in connection with the war and for the national good, and although the heating range of gas is so much more considerable than that of electricity, national kitchens are being largely equipped with electrical appliances; and the reason is the electrical influence in local government. Nothing will be able to battle with this established tendency so much as cheap gaseous fuel.

Coke-Oven Gas for Town Supply.

The features of greatest interest at the meeting of the Welsh Institution of Gas Engineers last Wednesday were the inspection of the large coke-oven installation now under construction at Port Talbot, and the paper by Mr. Evan Rees, of Margam, in which he discussed the questions which have agitated his mind in trying to decide whether or not he should adopt coke-oven gas when it is available for town-supply purposes. Decision in this matter depends very

much on individual circumstances; for it does not follow that what one undertaking can safely do can be done with equal safety by another. Middlesbrough, Leeds, and Sheffield are taking coke-oven gas; Birmingham and Darwen are making some of their own. Quite a number of small places near coking plants now utilize gas from them. Powers have been taken by some important local authorities in industrial areas other than those mentioned to do the same thing; and their schemes are under consideration. But the matter is one that within the last year or two has presented itself in new light; and, in view of the changes ahead, it will be more than ever necessary for gas undertakings, on entering into engagements to take coke-oven gas, to ensure that they are well protected. It was not long since that the coke-oven people themselves were talking of the sale of a portion of their gas supply for town purposes; but now many progressive coke-oven managers are, owing to indications supplied by war-time developments, talking more of the internal use of the gas they produce for the expansion, through the secondary products, of the area of their operations. On the other hand, the gas industry has also during war-time equally derived fresh guidance in the matter of technical development; and if the gas industry by its new methods can realize more per ton of coal than formerly, it will be a question of weighing in the commercial balance the results of its own operations with the profit and loss resulting from the purchase of gas from coke-ovens. The greater the commercial advantages that are obtained from gas-works carbonizing methods, the less the value, as expressed by the purchase price, of coke-oven gas to gas undertakings. Moreover, the gas industry is out for a higher standard of economy; and it is pretty certain that, in the near future, there will be a larger concentration of gas- and secondary products manufacturing plants, which will mean either the linking-up of the smaller undertakings by the larger, or else their absorption.

Future and local circumstances, therefore, both have part in the considerations affecting this question. But the temptation to enter into business relations is greater when one is situated as is Mr. Evan Rees, with a huge coke-oven plant rather more than a hundred yards from where his own small carbonizing plant is situated. In such a case, it is entirely a question of which is the more profitable plan, providing the coke-oven gas is of a composition that will answer the purpose. Both in the paper and the discussion there was much said as to whether the gas should be stripped or unstripped. If there were not parliamentary standards in the way, the war has shown us that stripped gas gives very good gaseous fuel, providing the inert constituents are not excessive, and the pressure is well maintained. The outlook points to the oil-washing of gas being continued in the future as part and parcel of the ordinary operations of a gas-works; so why object to stripped coke-oven gas—that is to say, providing it is not too drastically stripped? Much, too, was made of what was described as the high proportion of nitrogen in coke-oven gas. We only wish it could be said that there had been universally in the gas industry no higher total of inerts than are shown in columns "C" and "D" of the table in Mr. Rees' paper for unstripped coke-oven gas. When 30 p.ct. and upwards of incombustibles have been found in partially stripped gas produced under gas-works conditions, it is hardly the time to grumble over 14·1 p.ct. and 11·3 p.ct., particularly when the straight coal gas given by the author for comparison contains 11 p.ct., which is not at all bad. Last week a gas engineer of extensive experience was writing in our columns of 12 p.ct. as being a very fair limit for coal gas under ordinary conditions; and just as high percentages of inerts in town gas can be brought down to a reasonable figure by attention to the gas-works carbonizing plant and methods of operation, so they can be reduced by the same means in coke-oven installations. The percentages, however, that Mr. Rees quotes are not regarded by us as being extravagant. Another matter is the question of keeping in repair sufficient stand-by plant to cope with interruptions of the supply of gas from the coke-ovens; and stand-by plant means stand-by men. Precautions must naturally be taken; and what with Federations of Trade Unions and the prospect of some amount of difference of opinion as to the settlement of rates of wages after the war, one hesitates to form alliances that may complicate the difficulty with labour in perhaps the not distant future. But, generally speaking, the question of business relations with the coking industry for the supply of gas is distinctly one for decision on individual merit; and to it no common law can be applied.

Reconstruction of the Electricity Supply Industry.

The Committee appointed by the Board of Trade to consider the question of the electric power supply of the country have issued their report. It is not by any means a wonderful document; and it does not, either in bulk or matter, justify the time and railway journeyings spent not only by the members of the Committee but by quite a large number of estimable gentlemen who have given evidence before the Committee, because of their impression that they had something of importance to say on the subject of the inquiry. In their report the Committee have not been quite so bold as the Coal Conservation Sub-Committee on Electric Supply; and they have avoided certain of the conspicuous mistakes that the Sub-Committee made, and which mistakes have excited no end of criticism, wrath, and resentment, and have brought a good deal of ridicule on the one and only example of electricity supply that is supposed to be worth copying. The Board of Trade Committee are more modest. They are content (and their report is a unanimous one) with a few broad recommendations which are the echo of much else that has been previously advocated without any vast inquiry, but merely as deductions from the knowledge acquired by experience of past and present conditions.

It is urged that the control of the generation and distribution of electricity should be in the hands of a body to be called the Electricity Commissioners, to whom should be transferred the existing powers of the Board of Trade, the Local Government Board, the Local Government Board for Ireland, and the Scottish Office. We do not know that the existing Control Departments will care to part with their rights and powers. However, the Committee also recommend that there should be power of appeal from the Commissioners to Parliament. It is recommended that the present system of determining electricity areas by local administrative limits should be abolished. But the Committee have not taken upon themselves the work of suggesting any specific number of areas, nor any areas that should supersede the present circumscribed ones; but—and we think in this they are wise, if the recommended system of control is actually approved by Parliament—they propose that the Commissioners should have a free hand, and should, after holding local inquiries, divide the United Kingdom into districts technically suitable for economical generation and distribution. Over each area a District Electricity Board should be set up. The District Board should have power to purchase the whole of the generating stations of all the authorized distributors in the area, as well as to erect new generating stations, and to establish main transmission of electricity. But the Boards are to make no divisible profits. Present electrical undertakings may, it is suggested, retain their power of distribution, but must purchase in bulk from the District Board or lessees—due provision being made for controlling the profits of the distributors, so as to ensure a cheap supply of electricity to the consumers. The Committee also recommend that largely extended powers should be given in regard to wayleaves, the use of overhead wires, and the acquisition of water rights.

This, in brief, is the scheme that emanates from the much-talked-of inquiry. From the report, it is seen that the Commissioners should, in the first instance, be five in number, and they should have substantial salaries—not less than £3000 each per annum, with adequate pensions. In view of this, there will be a good many men who will consider themselves quite qualified for this particular job. It is seen, too, that in the opinion of the Committee provision should be made by which District Electrical Boards may provide compensation for all displaced engineers and other officials in case of hardship. Of course, there will be a good many displaced engineers who will consider themselves to be in circumstances of hardship. Most of them, anyway, could only officially continue as local distributing and sales managers. Of course, the Committee anticipate that the national advantage of these proposals will be next to inestimable—at any rate, they seem to approve of the comprehensive estimate that the sterling value of the advantage will run to at least £100,000,000 per annum.

It is a big proposition; and now the floodgates of controversy will again fly open. It can be said for the scheme that the Committee are beginning at the right end, by trying to collect the conditions as they presently exist, and to work from the prevailing position. It is the only sensible way in reformation of the kind to make a start by trying to adapt

present conditions to new ends. But whether the scheme is going to work out just as the plot of a novel, we cannot say. There is not a shred of financial or other evidence advanced by the Committee to show that it will do so. The justification for it (if there is any) is all away up in the clouds; and when economical production and sale are spoken about, one can see the District Boards—through having, as they must do, to purchase electricity stations good, bad, and indifferent—with a magnificent load of capital weighing upon them, for some of the existing concerns have not been over-careful with capital expenditure, depreciation, and so forth. There is certainty that the sins of the fathers of electricity supply will be visited upon the District Boards unto the third or fourth generation of such Boards.

Why, where there is not local capital finding, the Government should step in and financially assist, is not clear. All through the piece, the Committee contemplate special treatment for the electricity industry—treatment such as is not meted out to any other industry. It is difficult to see why electricity supply should be regarded as being any more important than the carbonization of coal, which supplies the wealth of coal to the sustenance of many industries, as well as satisfying numerous national needs. Financial support by the Government would give the electricity industry an alliance with the Government which would be a distinct advantage to it over other commercial industries, although it is an industry competing with others for light, heat, and power. It is not the same thing as the British dye industry with its strong German competitors. While admittedly some form of reconstruction would be of much benefit to the electricity industry, there is no substantial reason why there should be any departure in its favour from the ordinary lines of commercial development. Certain it is that local authorities owning electricity undertakings will kick hard against the proposed wholesale absorption of their generating plants, for which there is not a shred of vindication offered in the report. The position the Committee take up is apparently, "This is our report; and it is sufficient for you that we "make the recommendations we do." The whole report is bald in the extreme; and there has evidently been a studied intention to supply as few figures or hard facts as possible upon which controversy could hinge. But as to the municipalities, they are to lose their generating powers, and their profits are to be controlled. Is it likely that they will accept tranquilly such proposals? The very control of their profits (right as it may be) would undermine their energy as electricity distributors. The present electricity supply system is to be thrown into the melting-pot. What is to issue nobody so far knows.

Little is said in the report about coal economy. Seeing, however, the Committee had before them representatives of the National Gas Council, they could not very well altogether ignore the gas industry. But while there is a complimentary remark about the gas industry, it is quite plain there is no very great enthusiasm as to any business alliance developing between the industries—the one as fuel supplier to the other. This is what is said: "The efficiency and "wide extension of the gas industry has also to some extent "accounted for the fact that electrical progress has been "slower than might have been expected, especially in the "smaller towns and villages. The most pressing need for "electrical development is in those directions in which gas "can least efficiently compete. We are glad to hear from "important witnesses representing the gas interests that "they look forward to more mutual assistance in the future "between gas and electricity undertakings in the public "interest." That is all. The Committee offer no encouragement, or even mention the matter in their recommendations. Cannot the Board of Trade now have an inquiry into the question of the development of the gas industry, in connection with which the reference to the Board of Fuel Research is only a single item?

Coal Price Inquiry.

When the Act controlling the coal mines of the kingdom was in its draft state as a Bill, the House of Commons gave unmistakable evidence that it desired that the industry under Government control should pay its own way. Communications have lately been passing between the Coal Controller and the Mining Association of Great Britain on the subject of an increase both in the standard and the scheduled prices of coal. The Controller is anxious to secure a reliable comparison between costs, selling prices, and profit in the pre-war period and at the present time respectively, with a view to obtaining information as to the sufficiency or otherwise of the current prices of coal. It is to be hoped the result will be to prove the sufficiency of the prices; but the fact that the Coal Controller is making the inquiry will cause large buyers to be a bit uneasy. The Coal Controller, it is admitted by all, has had a difficult and intricate task to perform; and whether or not all agree as to the fitness to circumstances of every one of his plans, with common consent there will be congratulations to him on the distinction conferred upon him, which will henceforth cause him to be known as Sir Guy Calthrop, Bart.

Coal, Gas, and Electricity Rationing.

There is great activity over the rationing scheme. A draft report has been prepared; but it is still under discussion, and subject to amendment. As soon as the Board of Trade and the Coal Controller have finally ended the discussion, and from it all have found their proper bearings, the old unpopular scheme will be abandoned, and the new one will take its place. Sir Albert Stanley should very shortly now be in a position to give in the House of Commons the main features of the new scheme; but it would be better to have a little further delay than have something presented that is not the very best that can be done in the public interests.

An Association of Gas Administrators.

A short article by "A Gas Engineer" on another page revives the question of the need for the organization of the administrative interests of the gas industry. The matter was recently down for discussion at an informal meeting of gas engineers; but as the meeting was private, we are, of course, unable to give any account of the views expressed by the gas engineers who were present. Representation in a central organization of the administrative and financial interests of the gas industry is an old subject for the "JOURNAL"—in fact, it can be claimed that it was originally raised in its columns, although not in the form in which "A Gas Engineer" puts it forward. Our idea was a composite organization at the head of the industry, in which the administrative and financial interests should have a prominent place, seeing that nowadays there is so much affecting policy that has to be discussed and decision arrived at, as well as universal contribution required to maintain the co-operative work of the industry, that we cannot well see how gas administrators are to have their interest stirred and sustained, and their brain power brought to bear most profitably upon affairs that are of common importance to the industry, without association and contact. At the present time only a comparatively few administrators are brought into active participation with the industry's general work through the British Commercial Gas Association, and partially through the National Gas Council. But this we still maintain is not enough. "A Gas Engineer" favours a special organization of gas administrators, which would serve to balance the other organizations. Perhaps his way may be the best; but we still feel that there is something to be gained educatively by an intermingling of all interests in a large central organization, which would not prevent the gas engineers still having their special organization for technical purposes.

Industrial Councils and Gas Undertakings.

However much some people may object to joint action in the gas industry in regard to matters affecting employers and employed, it is a development that has to come and to stand. When a report such as that of the Whitley Committee, recommending Industrial Councils constituted of employers and employed, receives almost universal blessing, and the Government desire it to be understood that such Councils will be recognized as the official standing Consultative Committees to the Government on all future questions affecting the industries they represent, then those who are not favourable must, whether or not they like it fall into line. The matter of the formation of a Council for the gas industry has been, at the request of the Government, under the consideration of the National Gas Council; but there is a difficulty in the division of control of gas undertakings between private companies and local authorities. This is a point that is receiving the consideration of the Association of Municipal Corporations; and therefore further action is temporarily deferred on the part of the National Gas Council. The matter, however,

was under discussion, at a meeting of the Manchester District Institution of Gas Engineers last Wednesday. The discussion was introduced by some notes prepared by Mr. S. Tagg, of Preston; and in the discussion, which will be found reported in this issue, there appeared to be very general concurrence with his view that District Joint Councils are particularly applicable to the gas industry.

Departmental Jealousy.

We have often spoken of the need of co-ordination and co-operation between the different Government Departments. The need has had too obvious exemplification in contrary decrees, and in the ignoring of war essentials by certain departments, to call for any argument to prove the existence of the need. With most departments there has been a single eye to the achievement each of its own appointed objects, without any care for those of other departments; while there ought to be a pulling together with the one object of doing the maximum possible for winning the war, with the least injury to the economical interests of the country. Co-ordination is only a matter of will; and the different departments, being now in full swing with their work, could easily enough if the desire existed produce from among themselves a Council to whom all important proposals could be submitted to see that there is in them nothing detrimental to material interests affecting in any way either the war or national economy. But we are afraid it is the old tale. Jealousy of infringement of departmental power is at the bottom of the trouble. Hence the desire of many officials to keep the work of their own departments in water-tight compartments. But national interests should come before departmental ambitions and rivalry.

Inquiries by Departments.

There is no class of men who are more anxious than gas engineers to assist those whom the Government have put in charge of different public services. But those who are entrusted with such services should understand that gas engineers have their duties to perform; and difficult enough they are just now. We do not for one moment suggest that questions are needlessly put by Government Departments. But when they are asked, they might surely be framed in a lucid manner; and care should be taken that they are questions to which an answer can be supplied. Attention to these points would save a great deal of unnecessary correspondence and conference, and so time. Just recently information was asked of gas engineers regarding the percentage of gas used for power, industrial lighting, and domestic cooking, heating, and lighting, or the approximate percentages. The communication, however, was framed in such a way that it was difficult to interpret exactly what it was the department concerned required. In the second place, the inquiry did not take into account public lighting, and industrial uses other than for power and lighting. In the third place, seeing that so much gas for various purposes is supplied through a single meter, any answer could merely be more or less guesswork. Under such circumstances, there can be but little value in the returns. But anyway a clear statement of requirements should be a studied feature of requests for information; for it should be remembered that those carrying out the duties of a Government Department are not the only people who have work to do.

The Trade Boards Bill.

A Bill is now before Parliament having for its object an extension of the Trade Boards Act, 1909 (which is restricted to what are known as sweated industries). According to its provisions, power will be given to the Minister of Labour to establish Wages Boards for the fixing compulsorily of the rates of wages which employers may legally pay. The Employers' Parliamentary Council have drawn attention to the Bill, which is regarded as an attempt to fix permanently the inflated wages and artificial conditions of employment prevailing during the war. Under the original Act, extensions could be made only by Provisional Order confirmed by Parliament; so that there was secured to all opponents the right of being fully heard. From this course of procedure the Employers' Parliamentary Council fail to see any reason for departing; and they submit that such a Bill as that referred to should not be promoted in anticipation of the Joint Standing Industrial Councils to be established in the different industries. One essential function of these Joint Industrial Councils will be the fixing of rates of wages; and it is contended that "if they cannot be trusted to harmoniously settle such a fundamental matter as the fixing of the rate of wages, without their arrangements being subject to the decisions of a Statutory Wages Board, set up possibly at the instigation of some small number of discontented persons, their prestige will be destroyed, and the scope of their operations will necessarily be seriously diminished."

OBITUARY.

The Bournemouth Gas and Water Company have suffered a severe loss from the death of their much esteemed Chairman, Mr. GEORGE CRISPE WHITELEY, who died at Dulwich on the 28th ult., after some months' illness. He was born in 1845, and was called to the Bar in 1870. For a great many years he had taken an active part in local government affairs in South London. The question of co-partnership was one in which he had a very live interest; and one of the delights of his later life was to go down to Bournemouth and address the men at their meetings. Mr. Whiteley was an Auditor of the Brighton and Hove General Gas Company.

PERSONAL.

Mr. P. D. WALMSLEY, in addition to filling the position of Gas and Water Engineer to the Wombwell Urban District Council, has just been appointed Acting Surveyor to the borough "for the period of the war."

Among the latest promotions notified, we are pleased to see that of Mr. W. J. LIBERTY, from Lieutenant in the Royal Naval Volunteer Reserve to Captain in the Royal Air Force, attached to the Royal Navy for operational duties.

We understand that the applications received for the position of Gas Engineer to the Leeds Corporation are still under consideration by the Gas Committee. Some of the candidates will be interviewed within the next few days.

The Council of the Society of Chemical Industry have awarded the medal of the Society to Professor Sir JAMES DEWAR, F.R.S., as some recognition of the conspicuous services which, by his research work in both pure and applied science, he has rendered to chemical industry.

The Coventry Corporation Gas Committee have instructed Mr. P. N. LANGFORD, the Works Manager at Foleshill, to temporarily assume the managership of the whole undertaking, while a Sub-Committee are considering the question of the appointment of a successor to the late Mr. Fletcher W. Stevenson.

The Special Committee appointed by the Paisley Town Council to take steps for the recommending of a successor to Mr. G. R. Hislop, who is shortly retiring from the management of the burgh gas-works, have unanimously recommended the appointment of Mr. ANTHONY S. NISBET, who has been Assistant Manager of the works for several years past.

Corporal W. T. HOBSON, of Donnington, Salop, has been awarded the Military Medal for gallantry during recent operations in France—he having carried important despatches under heavy shell fire. Corporal Hobson, who has been in France for nearly three years, prior to joining the army was engaged as draughtsman on the staff of Messrs. C. & W. Walker, Ltd.

On the occasion of his 53rd birthday, His Majesty has been pleased to declare that seven new Privy Councillors shall be sworn—including Sir EDWARD A. GOULDING, Bart., M.P., a Director of the Continental Union Gas Company. Among the Baronetcies conferred are two in which "JOURNAL" readers will be specially interested. One is upon Colonel EDWARD A. BROTHERTON, for public services as Mayor of Wakefield and of Leeds, and as Hon. Colonel for raising and equipping, at his own expense, the 15th West Yorkshire Regiment. Mr. GUY CALTHROP is made a Baronet for public services as Controller of Mines, and as head of the Department of the Board of Trade which has control of the coal mines of the United Kingdom. He has been responsible for the inception and carrying out of the scheme for the reorganization of transport of coal within the United Kingdom. Among the new Knights are Mr. J. C. L. COWARD, K.C. (Recorder of Folkestone, who has often taken part in the settlement of gas questions), and Mr. J. M. FROST, J.P. (Chairman of the Chester United Gas Company). Sir HUGH BELL, Bart. (well known among engineers in the North of England), is appointed a C.B., for services rendered in connection with the war; and Lieutenant-General Sir ALFRED KEOGH, G.C.B., C.H. (late Director-General of Army Medical Services, and ex-President of the Society of British Gas Industries), becomes a G.C.V.O.

The toluol plant of the People's Gas Light and Coke Company of Chicago is running at full capacity. The Company have a contract with the Government for toluol for various munitions factories, which involves in the neighbourhood of $1,000,000 a year.

THE WORKS OF BRITISH DYES, LTD.

Inspection by Technical Journalists.

Last Friday, on the invitation of the Directors of British Dyes, Ltd., a party of technical journalists representing the chief papers of the chemical, engineering, textile, gas, electrical, and dyeing industries visited the works of the Company at Huddersfield, and spent four hours in observing the organization and the products of this most important undertaking. The party were received in the Board-Room at the Turnbridge end of the concern by Mr. James Falconer (the Chairman of Directors), who the previous day had had the honour of receiving the King and Queen upon their visit to the works.

Mr. Falconer, in extending a cordial welcome to the visitors, said it had been observed during the two years of their existence that nobody had heard of their doing anything; and most people seemed to have assumed that they were doing nothing. It had been the deliberate policy of the Board to go ahead with their preparations, and to say nothing about their work until thay had actually accomplished something, and were in a position to enable people to see what products they were able to make. It had, indeed, been impossible for them, in face of the technical difficulties they had had to meet, to give any confident opinion as to what they would be able to accomplish; and there was also to be considered the point that it would have been awkward if they had made promises or raised hopes beforehand which had not come off. During the two years since they commenced the building of their new works at Dalton, they had had the advantage of the experience and skill which had been gathered together at the works of Messrs. Read Holliday & Sons, Ltd., and of the greatly extended skill which had been absorbed into the new organization; and this organization had been working as well as the war conditions in regard to labour and material would permit, in laying the foundations of the undertaking.

The visitors were then divided into parties, under the guidance of Dr. M. O. Forster (the Chairman of the Technical Committee) and Mr. Dean (the Chief Chemist), as the authorities on the chemical side, and Mr. Robinson (who is largely responsible for the installation of the new plant), and Mr. Bastow (the Chief Engineer of the Company), for information on the mechanical side of the matter.

The Old Turnbridge Works.

The tour of the party commenced with passing through the offices in the old Turnbridge works of the former Read Holiday and Sons. These have been re-organized on the American system. They are almost the only part of the undertaking now conducted, in a manner of speaking, on the "new wine in old bottles" principle. The manufacturing processes originally carried out by Read Holliday & Sons in peace time, and continued by them in the first half of the war period, have been maintained; and certain extensions entered upon by the old Company were completed, after British Dyes, Ltd., was formed in April, 1915, to meet the immediate need for greatly increased output before the construction of new works could be entered upon. While, however, it is evident that every effort has been made to secure the largest possible use of the old area, it is clear that the Directors of British Dyes must have been very greatly relieved when they acquired 400 acres of additional ground in the immediate neighbourhood, which could be linked-up with Turnbridge, and have easy means of communication from end to end of the enlarged estate.

The method of utilization of the old buildings for small plants for the manufacture of chamber sulphuric acid, nitric acid, hydrochloric acid, &c., was admired by the visitors; and they realized to the full the urgency of the step which was taken in the increase of distance—by effect of the extension of ground—between the dangerous acids and the elements which might be causes of explosion. Carboys of nitric acid are now to be observed in huge quantities on the spare land between the old and new works; and the picric acid is planted in a remote part of the new site, with a hill between it and the population of Huddersfield, which might be very serviceable indeed in case of the serious mishaps which have occurred elsewhere, but from which British Dyes have so far been most pleasantly immune.

The acquisition of the 400 acres for the Dalton works made one difference which should be referred to as being at the very basis of large development. Whereas previous to the acquisition of the new site practically all goods had to be carted to and from the railway station and the Sir John Ramsden Canal, a railway line about 1½ miles long now connects the old works with the private sidings of the Company at Kirkheaton, on the main line of the London and North-Western Railway; and the carriage of all heavy goods is thus much facilitated. This vital link, by the way, brings one to a total railway service within the area of the new estate of about 15 miles.

The New Dalton Works.

At Turnbridge, the visitors boarded a special train, kindly provided for their convenience, and proceeded to the new Dalton works. The train was drawn by one of the Company's fireless steam locomotives, such as are now used in modern large munition factories where fire risks are very great. On this strip of about two miles to their destination, they passed the large coal, pyrites, and benzol stores on the low level along the river side. On the hill side, in a prominent position, was seen a handsome building known as "Dalton Grange," fitted up as an attractive club for chemists and engineers belonging to the two works, who already number about 150. The club is found to have excellent use as a common ground for quiet consultative purposes. A small portion of the new site consists of elevated ground, some 150 ft. higher than the lower area.

Here, on the top, was pointed out a large reservoir for process water, which is pumped continuously from deep wells, of which several have been successfully completed. The river water does not appear to be any better than one might expect in a valley containing so many woollen mills and chemical works, and is not suitable for boilers or processes, but is largely utilized for cooling purposes. It struck one that in dry seasons a river like the Colne might be found to provide insufficient cooling water for a huge chemical works such as is evidently in contemplation, without having recourse to such water-saving devices as water-towers. At any rate, the problem of water supply for so large an undertaking must necessarily be a matter of grave concern to the Company's engineers. It is understood a large laboratory for pure research is to be erected in a commanding position on the hill referred to. Let us hope that the results of its researches will place British Dyes in a commanding position in the world's markets for dyestuffs.

The new site was acquired in the autumn of 1915. Since then many fine buildings—they are generally given the undignified name of "sheds"—have been erected; and a good number have been filled with the requisite plant. In 1915 and 1916, it was comparatively easy to obtain steel; and therefore the different plants made rapid progress. Now, however, circumstances are very much altered in this respect. We do not think the practice of designing and erecting buildings first, and adapting plant to them afterwards, as has, apparently, been done here in many cases, can altogether be defended; but this is not meant to imply that we failed to appreciate the plan of the arrangement of the buildings themselves. It must be said we were highly pleased with the standard design of the dyestuff and intermediate product "sheds." These buildings are about 90 ft. wide, in two spans of 45 ft. In length, they are 270 ft. There is a gap of 90 ft. between buildings, to allow of this space being roofed-over without altering the span; and in two or three cases the original gaps have already been filled up. The roof principals are in timber; and the outside walls are built of good red-faced brick, tastefully panelled, and ornamented with sandstone copings. When the visitors reached these buildings, they were joined by Dr. W. B. Davidson (Chief Chemical Engineer), who courteously assisted in explanation.

Oleum Manufacture.

Time did not permit of more than a cursory inspection of the various processes. The most imposing one—and probably the most intricate—is that of oleum manufacture. Oleum, as some of our readers may not know, is the modern name for Nordhausen (fuming) sulphuric acid; and it is usually manufactured by what is called the "contact" process—that is, by the aid of a catalyst (platinum or iron oxide). The main advantages of this process over the old-fashioned chamber acid and concentrating plant are in the high strength and great purity of the product. This magnificent plant, erected two years ago by Messrs. Simon-Carvès, consists of twelve units, each of the same design, and each capable of producing 10 tons of oleum per day.

The process is the well-known Grillo process, where calcined Epsom salts covered with a thin coat of finely divided platinum is the catalyst. The plant at the East Greenwich works of the South Metropolitan Gas Company is of the same type, but differs from this in that it consumes sulphur instead of pyrites.

This plant impresses one with its similarity to that of a gas-works. There are gas-generators, purifiers, washers, exhausters, spray-catchers, absorbers, &c., in lengthy series; and the difficulties of working will no doubt be similar to those with which the gas engineer is ordinarily confronted. It is interesting to observe how lead and steel and cast-iron are used in different portions of the plant where they are severally best suited to resist the corrosive action of gas or acid. For high strengths of acid, over 90 p.ct., steel and cast-iron are preferred to lead. One particularly admires the numerous welded steel vessels used as gas-coolers, absorbers, &c. The plant is said to have cost over £300,000. The platinum alone involved an outlay of about £40,000, and must be worth much more now, at the present high price of this useful metal. The ground covered is about 5 acres; but there is ample space provided for extension. To inspect this plant so as to enable one to understand the process properly, would take a whole day; and the foregoing general description must suffice.

The oleum as such, or diluted down to the required strength (95 to 100 p.ct.), is stored in elevated boiler-tanks, which deliver into railway tank-wagons. The freezing-points of different strengths are so high that in winter special precautions have to be taken against freezing, which is a great nuisance if, unfortunately, it takes place.

The Mond Gas Plant.

Another plant of special interest is the Mond gas installation. This consists of six large producers, with the usual arrangement of coal elevator and overhead hoppers. The air-blowers are of

the steam turbine type. It was rather surprising to find so large a producer plant working under non-recovery conditions; but it is understood that ammonia will be produced and recovered as soon as it is possible to procure the necessary apparatus. The tar is converted by rotary open steam-heated evaporators directly into pitch and used for road making.

The principle has been adopted at the Dalton works—and we believe it is the right one—of applying gas for heating wherever possible in preference to coal or coke; convenience and ease of regulation and (with ammonia recovery) cheapness of fuel being the chief considerations. There is a complete and extensive network of large steel gas-mains, supported about 22 ft. high on steel stanchions placed some 80 ft. apart, starting and radiating from the gas plant and supplying the oleum, concentration, nitric acid, and other processes. It is expected that the plant will be at least doubled when the works are complete, and provision has been made on the site for this purpose.

About the boiler-house and electric generation house it may be remarked that at present steam is generated by means of a battery of some twenty Lancashire boilers, fitted with mechanical stokers, economizers, superheaters, feed regulators, and other accessories necessary for reducing the fuel consumption to the lowest limits. Apparently, no attempt has yet been made to apply producer gas for the purpose of boiler firing. The electric generators, three in number, are turbine driven; the steam being mostly condensed by jet condensers. Part of the steam is sent through low-pressure mains long distances to different processes, for boiling-up, vacuum drying, &c. The visitors were informed that a large central boiler plant of the Stirling type is in course of erection; but no doubt, with so large an area to supply, boiler installations will be required at different places on the works.

The concentration house contains twenty cascade units, each capable of turning out at least five tons of concentrated acid daily. This plant is of the ordinary lead pan and silica basin (in two rows) type, and calls for little comment.

The large nitric acid plants were pointed out to the party; but a close inspection was impossible. The larger house contains vertical retorts working on the Valentiner (vacuum) system; the other installation consisting of smaller horizontal retorts. The visitors were informed that there is not much to choose between the two systems in efficiency.

The Laboratory.

The works research laboratory is a large building accommodating a great number of chemists working exclusively on dye-stuffs. Asking for a comparison between the Read Holliday staff of research chemistry in the early days of the war and the present staff, one was gratified to be informed that the number had been multiplied by ten at least.

The outstanding feature of the laboratory is the small-scale plants used for trials of processes very much larger than is understood on a laboratory scale, and yet, perhaps, only one-fiftieth or one-hundredth the capacity of a working scale. Small digesters, autoclaves, filter presses, vacuum drying chambers, and stills—all beautifully made—were to be seen at work. This plant is accommodated in a large building attached to the laboratories proper. It must prove a valuable aid to the engineer who has to construct the large-sized apparatus for the final process.

The Remaining Plant.

One comes now to the main bridge crossing the river about the centre of the works. Here it is possible to comprehend fully the general lay-out completed and intended. The main road runs from Ashgrove Road, the front entrance, and will ultimately be over three-quarters-of-a-mile in length, and perfectly straight, except, perhaps, for the last 200 yards. It is so far only half-finished; but, all the same, it makes a fine impression. It is 120 ft. wide, well made, and finished with tar macadam. On either side are two parallel sets of rails, off which branches are taken to the "sheds," which are set at right angles to the main thoroughfare.

Between the outer rail and the gables of the buildings are supported, on steel stanchions and brackets, producer gas mains, low and high pressure steam and compressed air mains, and sometimes concentrated acid pipes. The system of services thus installed is most convenient and complete. Process and cooling water are carried for the most part in cast-iron pipes underground. These mains are of unusually large dimensions, owing to the magnitude of the service and the long distances. Electric mains are also for the most part underground.

Just across the bridge there is the refrigerating plant, used principally for making ice for the well-known diazotizing process. Part of the plant is used for circulating ice-cold brine through nitrating pots in the neighbouring paranitraniline shed. This consists of four large electrically driven compressors; the cooling medium being ammonia. The plant was erected by the Lightfoot (formerly Linde) Company. Its total capacity is equivalent to some 90 to 100 tons of ice per day. It is a model of neatness and cleanliness; the steel work of the compressors being highly burnished and touched-up in a way reflecting great credit on the workmen.

Betanaphthol is manufactured on a large scale close by. This is one of the principal intermediate products, whose manufacture is so important if this country is to wrest the trade from Germany. It is a derivative of our old friend naphthalene, as the name implies. After the process of diazotizing, certain bodies possessing amido groups—for example, aniline—by treatment with sodium nitrite and acid, give, with a solution of betanaphthol, in a comparatively simple way, dyestuffs of various colours. Hundreds of colours can be produced in this manner.

Other intermediate products introduced—swiftly, but with painstaking explanation which made things very clear—were paranitraline, "H acid," benzidine, and primuline. At least three-fourths of the work entailed, both in plant and labour, consists in the production of the various "intermediates." These are produced from benzene and toluene (extracted from coal gas), phenol, naphthalene, and anthracene (obtained from coal tar). It goes almost without saying that the quantities of T.N.T. and lyddite produced for the service of the nation in the war in the course of the various processes described are very material indeed. The visitors were told what these quantities are, but were asked not to disclose the figures.

The last feature of the tour was a sight of the exhibit prepared for the inspection of the King and Queen, who had visited the works the previous day, and thus had ocular demonstration, as the technical journalists had, of the fact that British Dyes, Ltd., now obtain all the colours of the spectrum from the products of coal tar distillation, and had thus made immense advances on pre-war conditions.

Speeches at the Luncheon.

The visitors were entertained to luncheon after their tour of the works—Mr. James Falconer, M.P. (the Chairman of the Company), presiding over a company which included also a number of the chief chemists and engineers. The vice-chair was occupied by Mr. Joseph Turner, who was Chairman of Messrs. Read Holliday & Sons, and is General Manager of British Dyes, Ltd.

The Chairman, speaking briefly after the lunch, said that it was a source of satisfaction to the Directors to find that during the period of delay, while they were determining how to set about the work without making fundamental mistakes, the Technical Press had refrained from unkind criticism. There had not been any pulling up of the flower to see how it was growing. They would all now see that the real key of the industry lay in the manufacture of intermediate products of which dyes were made; and in proportion as they succeeded in making the intermediate products, they mastered the situation. The Company had now had experience of plants which afforded a very fair test of what the organization could produce; and with these plants there was a great variety of processes. These processes, when they were going on to other plants, would have to be reproduced in different arrangements with substantial modifications. The technical people on the staff agreed that what had been done was a really fair test of the kind of work that they had to do in the future, and that they had now come to the position in which they were able to say quite publicly that they had established in their own minds confidence that, given time and labour, material and money, they could do what they had been set to accomplish—that was, to establish a supply of dyes manufactured in this country certainly equal to, and probably superior to, the supply in any other part of the world. In such an organization as this, it was necessary to have service of the highest order from both chemists and engineers; and it was most important also that chemists and engineers should be got to work together. These requirements they had achieved in the undertaking. He believed thoroughly in the superiority of the raw material of this country in regard to both chemists and engineers. Although other countries had far surpassed our own in the measure of the training given to such technical men, it was the fact that almost all the great inventions in both chemistry and engineering had originated in the British Isles. There was no better illustration of this than in the case of aniline dyes. But this was only one of many such cases. All that was necessary was to secure that the best use would be made of the skill of the country by the encouragement of research. There should be frank and open statement of the needs, and readiness to meet these needs; and if the Technical Press could help in this matter, it would be doing good service to the industries of the country. This was the spirit in which British Dyes meant to go on; and it was in this spirit that they appealed for encouragement and assistance. They were regarding the development of the work as a national duty. It was not a matter of profit which was in their minds, for they were strictly limited as to their dividend; but, seeing clearly a national need, they hoped to be privileged to perform a national duty.

Mr. Joseph Turner said he considered that so far the Directors had been pursuing the right policy. He thought that it would be acknowledged that a great deal had been done by the Company. Yet the directors, managers, chemists, and engineers were not at all satisfied. They all said that a great deal more would have been done if they had been helped as they well might have been. They had, however, been laying down the foundations of a great industry. While this was being done there was, of course, not much to be seen; but they felt that they were now at the top of the hill, and were in the position that they could make good progress. They had already manufactured intermediates that our German enemies thought could never be manufactured in this country. He agreed with the view of the Chairman that there was no brain power in the world equal to that of the Britisher if it was rightly applied. The men whom the Company had in their employ had applied their brains in the right direction, and had taken the first step towards capturing the markets of other parts of the world for the British aniline industry. He, personally, had never doubted the possibility of this. To-day he was more sanguine than ever he had been that it was possible, if only the help that they needed was given. The Government of this country had control of the raw products from which the intermediates were made; and what they were asking was that the Government would put them in the same position as the enemy with regard to the raw products. If this was done, they would undertake to manufacture intermediates and dye-stuffs equal in variety, quantity, price, and quality to anything that the enemy could produce. But they must ask the Government to help them also in the matter of research. They must ask for such arrangements that, when the war was over and the victory was won, the young men of this country should have as good facilities for research as were possessed by those of any other country.

ELECTRICITY SUPPLY MEMORANDA.

UNTIL the report of the Board of Trade Electric Power Supply Committee is published,* there seems little good in proceeding with schemes of electrical unification; and yet encouragement appears to be freely given by the Ministry of Munitions to move along the lines laid down by the Sub-Committee of the Coal Conservation Committee of the Ministry of Reconstruction. Why this haste is not clear, in view of the fact that there is little probability that the schemes for some time to come will get further than a paper stage; and the Board of Trade are bound to put their veto upon them if they do not think they are of a character which they can weave into their own "national" scheme as finally developed. We should not be surprised if departmental jealousy is not at the bottom of this evidence of independent activity, combined with municipal anxiety to safeguard their electrical interests. Take, for example, Nottinghamshire and Derbyshire. The Corporation of Nottingham have been considering a scheme; and now the report comes that in these neighbouring counties matters are moving very quickly in regard to electrical unification. There has been a meeting of the coal, iron, and steel industries of the two counties, at which a representative of the Ministry of Munitions was present, by whom information was afforded as to the "Government proposals" regarding electrical unification in the two counties—an object of the gathering being also to consider the question of linking-up with the South Yorkshire scheme. What is meant by the "Government proposals," we have not the ghost of a notion. We should have thought that "Government proposals" would not have matured until the report of the Board of Trade Committee is available, though there is little doubt that it will, in the main, follow the principles of concentration outlined in the report of the Sub-Committee of the Coal Conservation Committee, which document seems to have been so highly coloured by the brush of Mr. C. H. Merz and with pigments supplied by companies working on the North-East Coast with which he has so much to do. However, it is stated that it was decided, at the Nottinghamshire and Derbyshire conference—after hearing an explanation by Mr. A. B. Gridley, the Government expert—that a Committee should be appointed to consider a scheme similar to that adopted by the Nottingham Corporation, and that an expert should be engaged to prepare a report upon the best means of electrical supply for the district, having regard in doing so to the recommendations of the Sub-Committee of the Coal Conservation Committee. The Board of Trade Committee must be extremely pleased over this flouting of their existence, work, and plans. But schemes cannot be carried out without legislation; and this session there has been inserted in Electric Power Bills a clause subjecting the powers granted to any general legislation that may hereafter be passed as a result of the Board of Trade inquiry. Again we ask, Why, in view of this, all this violent hurry? If, instead of a representative of the Ministry of Munitions, one had been present from the Board of Trade, we could have much better understood the position.

Jealousy and Electrical Unification.

While municipalities are extremely anxious to keep under their immediate control electricity generation, as well as the distribution and sale of electrical energy in their own areas, there are some of them who will not be averse to rearing a super-station within their own territory and annexing for electrical supply as much as possible of the surrounding country—despite the fact that there may be within the annexed area a number of independent local authorities. These authorities would naturally object to come under the control electrically of a large neighbour; and the proper course to take in the circumstances would be the creation of a Board, with some form of *pro ratâ* representation. An example is supplied by Edinburgh. The Electric Lighting Committee there have had the matter under consideration for some time past. Now they have adopted resolutions which submit that, in the event of large electricity supply areas being established, Edinburgh should be one of the centres to be created. They also suggest the urgent necessity of being allowed to proceed with the erection of a new power station at Portobello, which, in their opinion, so completely conforms to the conditions laid down as to what a super-station should be. The Committee are also anxious that the authorities in London should receive a deputation, so that the position and claims of Edinburgh should be considered. Edinburgh is not the only municipality that has been looking at the electrical political situation from the p int of view of the preservation of their own particular status in view of the now assured change to concentration of electricity generation, though to what extent it will be carried is not yet a matter that has been determined. Nor is it likely to be for some time yet, at the rate things are moving. And then the change-over from present conditions is not a matter that can be accomplished at high-speed.

Municipalities Looking Ahead.

Municipal ambitions are again illustrated by Salford. If there is general concentration of generation, we should imagine that Salford would in time be linked-up with Manchester for that purpose; but Salford has apparently a notion of becoming an electrical centre of some importance on its own account. A report by the Electrical Engineer (Mr. J. A. Robertson) refers to the long-discussed matter of the interconnection of Lancashire and Cheshire undertakings. The scheme contemplates the supersession of power stations not favourably situated for cheap generation, the extension of stations already operating on favourable sites, and the erection of several new large stations built and equipped on the most scientific lines on selected sites. Salford has a power station; but Mr. Robertson admits that it is not favourably situated. Still he claims that Salford, being such a considerable manufacturing centre, would justify the erection of a new station within, or near to the borough boundaries. This, we take it, means that Salford in any scheme with which it is associated desires to continue to be top dog; and this it would not be with Manchester in the same union. However, these are all indications of the defence of local interests that is going to be set up by the big municipalities, and of the scramble there will be for municipal supremacy in any schemes that may result from departmental investigations. That the municipalities do not intend, if they can help it, to let the power of control slip out of their hands in the manner adumbrated in the report of the Sub-Committee of the Coal Conservation Committee has been amply demonstrated by what has been recorded in the recent past and again now.

Another Instance.

An interesting question connected with the concentration of electricity generation is the position of the large coast towns. They are not, as a rule, the centres of big industrial or densely populated areas. They usually run lengthwise on the coast, and have not any great depth; and the hinterland is mostly agricultural, and dotted with small villages. The large seaside towns are therefore (so to speak) in a position of isolation. The matter has been under consideration by Mr. R. F. Ferguson, the Electrical Engineer of Hastings; and "Meteor," in the "Electrical Times," calls attention to his observations on the subject. One important point made is that the coast towns have an unlimited supply of cold water for condensing purposes, which is of greater importance than contiguity to a coal mine. The time comes when collieries show signs of exhaustion, and become more expensive to work, while the sea flows on for ever. "Meteor" presents Mr. Ferguson's scheme in a nutshell, so that we trespass on his good nature, and appropriate the contents of the nutshell: "Why," he asks, "should not Bournemouth schedule an area to join with Southampton, Southampton with Portsmouth, Portsmouth with Worthing, Worthing with Brighton, and so on with Eastbourne and Hastings. This is how Mr. Ferguson sees it. These comparatively large seaside towns fringe a broad agricultural belt; and this belt could probably be fed in a manner different from that best suited to the areas round Birmingham, Sheffield, and Glasgow. It seems to us that this is rather a pretty problem. Its main feature is development along a coast line, as compared with the radial development of a spider's net; but that is only one of its characteristics."

Position on the Southern Littoral.

The foregoing information all directs attention to what is for the gas industry the salient fact, that the electric supply industry—in ways varying according to position in respect of size of undertaking or company or municipal ownership—is bending its course towards the only means whereby it may realize cheaper production, which, as we have often said, means an improved commercial position. If this improvement is obtained by the plans adopted, it follows that the industry will be in a stronger competitive position. Electrical undertakings are in an inferior situation to gas undertakings owing to the low heating value of electricity in relation to cost. Much current must be used to get up to, and to maintain, high temperatures; and consumers find this very expensive. It is this costliness that the generation concentration schemes are destined to reduce. Whether or not they will succeed is not the question. The attempt is being made; and, whatever the success, so much greater will be the encouragement to develop business in not only industrial heating, but domestic heating and cooking. Compared with the gas industry, the electricity industry, through the inefficiency of electricity for various heating purposes, has only secured an infinitesimal share of the cooking and heating business; and it will have to get down to shadowy figures per unit before it will be able to compete on level terms with gas. But in connection with cooking, it shows at its best—and nowhere else—with the oven and the grill in establishments where a large quantity of work has to be done. It is precisely the same with gas. Work can be accomplished at proportionately lower cost for a large than a small quantity. The electricity industry is in every conceivable way doing its best even now to stimulate business in these directions, though suffering from shortness of materials and labour the same as the gas industry. Electrical undertakings are getting a good look-in in national kitchen work, but more through influence than merit; and they do not forget to make a song about what they are doing. They have learnt that opportunism is an excellent thing to study; and though the case that they can present for

Electric Cooking and Heating Organization.

* Since this was written, the report of the Board of Trade Committee on Electric Power Supply has been presented to the House of Commons, and some of its features are noticed elsewhere in this issue.—ED. G. J.]

electrical cooking is not a particularly sturdy one, they make the best use of it. And they are obviously intending to do more by a special organization. In their annual report, the Committee of the Institution of Electrical Engineers state that they have appointed a Committee to prepare a scheme for the formation of an Electrical Cooking and Heating Association. This is interesting; and the gas industry must not—when born—overlook its existence and its operations.

National Kitchens and Anxious Electricians.

The electrical papers appear to be under the impression, however, that all that should be done is not being done by electricity in connection with National Kitchens. They would like electricity to scoop in every atom of this business. There is a disposition to look a bit dubiously upon the aid rendered by the Government in connection with the matter; and it is felt that the performances of local authorities are not all they might be. Quite recently, it was submitted by Mr. Bowerman in the House of Commons, that there was delay in providing equipment for the kitchens through the Ministry of Munitions not granting a sufficiently high priority number for the manufacture of the goods. The answer given was that the Director of National Kitchens was quite satisfied with the priority accorded by the Ministry of Munitions, and that arrangements had been made recently for the supply in substantial quantities of the raw materials required in the production of cooking plant. So far this is satisfactory; and we have not the slightest doubt that the manufacturers of gas appliances are keeping good pace with any advantages they can secure for turning-out equipment. But the contributor of "Cooking and Heating Notes" in the "Electrical Times" is manifestly not satisfied. He calls attention to the fact that a certain American works could ship daily quite a number of electric-cooking equipments if the existing import restrictions were removed. These equipments would be of great assistance in solving the problem of establishing the greatest possible number of National Kitchens in the shortest space of time. We do not know anything about the quality and efficiency of the American types of electric-cookers; but gas undertakings have a preference for British manufactured gas cookers and fires. Of course, this idea as to shipping American electric goods is due to the fact that the electricity people are afraid the larger resources of the British gas-stove manufacturers will give gas a quantitative pull over electricity.

COULD THE PRESENT REPRESENTATION OF GAS INTERESTS WITH ADVANTAGE BE IMPROVED?

By a Gas Engineer.

The above question was put down for discussion at an informal meeting of gas engineers at which the writer was unable to be present; but holding somewhat strong views on the subject, he ventures to set them forth with a hope the matter will be more fully discussed through the "Journal."

The gas industry is at present represented by the Institution of Gas Engineers, the National Gas Council, the District Associations, and the Commercial Sections, consisting principally of executive officers of gas companies and corporations. The Councils or Committees of these Institutions are, in most cases, men of standing in the profession, possessed of executive and administrative abilities. In his executive capacity, the engineer or secretary accepts a responsibility for the advice given by him to his directors or committee, and, to a limited extent (more or less, according to circumstances), in an administrative capacity. Still, his primary office is executive. Of directors, it may be said that many possess considerable executive ability; but their primary office is administrative.

During the past few years (for the period of the war, at least), many subjects have been brought before the Institution, the National Gas Council, and the Associations, which have been of a purely administrative character; and these subjects have been dealt with by the members of Councils, consisting of executive officers who may have been in touch with their own boards of directors. But to all intents and purposes, these executive officers were "go-betweens"—that is, between their directors and the Government Department concerned.

It is true that on the Councils there is a sprinkling of directors, managing directors, and chairmen of committees; but if carefully considered, it would, no doubt, be found that the position or capacity of these gentlemen is more executive than administrative. We arrive at the point, therefore, that the administrative element of the gas industry is not fully represented in our Councils, and what is wanted is a federation of gas companies and corporations for the consideration of, and dealing with, matters of administration. The Council of the federation should consist of directors and chairmen of committees; and the Council should have a full representation on the National Gas Council.

As to the reasons for this opinion.

First, take the "financial hardships," or sliding-scale, question. What is this but a purely administrative subject; and it would, no doubt, have been better presented to the House of Commons Committee if it had been considered by a Federation or Council of Directors.

Secondly, the gas industry has been asked to consider the terms of the Whitley reports with a view to the formation of representative bodies consisting of employers and employed. Is not this in the first instance purely administrative, and a subject for consideration by a Council of Directors?

Thirdly, the Federation of Workmen's Unions has succeeded in obtaining a decision on wages affecting the whole industry at one and the same time. Coming events cast their shadows before; and it being a matter of administration, it should be dealt with by a Council of Directors.

Fourthly, the subject of reconstruction after the war is being considered by every department and industry throughout the country. Surely it is time this subject should be taken in hand by heads of the gas industry, which again should be a Council of Directors.

GAS, COAL, AND ELECTRICITY RATIONING.

By "Cricket."

The details of the new scheme, provisionally arranged, which have been talked about during the past weeks, are satisfactory in some respects. The Board of Trade appear to have come to the wise conclusion that the original scheme only resulted in more coal than ever being burned by householders; and now it is to be based on a rationed coal allowance, direct and indirect, per room used. In the case of small houses, it is probable that a coal coupon system will be adopted to prevent an extravagant use of coal by purchase in small quantities from trolleymen.

The very highly important information has come directly to my knowledge that the Minister of Munitions is in communication with the Coal Controller on the subject as the importance of supplies of coal in connection with the output of bye-products is a matter of special interest to his department. This is good news, and should be comfortable reading to the gas industry. Co-ordination between the departments is exactly what is required in the national interests, especially as this war will be won chiefly through the instrumentality of English coal. No better use can be made of coal than distilling it; and the better the coal in volatile matter, so much more bye-products for national use will be recovered per ton of coal. As was shown in the article under this heading in last week's issue of the "Journal," many varieties of household coal are of exceptional value when distilled. If we are to have less coal at gas-works, let that which we are to have be of the very best quality, to yield the highest results. The Ministry of Munitions, according to my information, are taking up the matter of the importance of bye-products from coal also on behalf of the War Office.

To complete the co-ordination, I would like to hear that the Minister of Munitions is also taking up the matter on behalf of the Admiralty and the Food Production Department. The latter department still seems to be under the impression that electrically equipped national kitchens are as useful in a national sense as those equipped with gas. They confess that there are about as many of each, but they fail to discover the importance of using gas solely on account of the bye-products. National kitchens are entirely a war measure, and should be used to the greatest extent directly and indirectly for the greatest national benefit. Burning coal under steam-boilers for the purpose of generating electricity is merely wasting bye-products which could be recovered if gas was used. With the relentless and cruel enemies we are fighting, no stone should be unturned to procure the greatest advantage from coal. Any failure to do so is of advantage to the enemy, and should not be allowed. I feel sure when the Department have fully reflected upon the subject, they will see the point.

One very great danger in regard to coal rationing to gas-works looms ahead. Many works have only one or two weeks' stock of coal at the present rate of consumption, in spite of blue gas and gas rationing. In many instances, little if any improvement is being made to stocks, mainly due to rail transport difficulties. Unless a remarkable improvement sets in, this is courting disaster next winter. It is quite impossible for a gas-works to supply next winter's demands for gas (in spite of gas rationing) if no improvement takes place in the quantities of coal now being delivered. There is a limit to the make and quality of gas per ton of coal, even taking blue gas into consideration. The result will be that only a summer supply of gas can be given in winter. There can be only one remedy if the coal supplies are not improved, and that is to ruthlessly cut off gas supplies to private consumers. To supply at a low pressure is impracticable, because the ends of the districts will get no gas at all if consumers' taps are under their own control. The pressure and supply to essential works and institutions must be maintained at all costs. The matter is a very serious one, as any ruthless cutting-off of consumers' supplies is bound to lead to disturbances.

The railway arrangements must be reorganized. This matter was dealt with in an article which recently appeared in the "Journal," under the title "The Railborne Coal Muddle and the Way Out," extracts from which were given in some of the London newspapers. The sooner some such scheme is put in operation the better. Things cannot go on as at present.

There is also the matter of luxury trades. They are by no means stopped. True, the Military authorities are taking a large number of the employees of the luxury trades for the Army and

Navy; but there is no measure to prevent them acquiring fresh hands above military age to carry on. The important point is that they are consuming coal. Their coal supplies must all be stopped and turned to national benefit.

To return to the details of the new gas-rationing scheme. The 15,000 c.ft. of gas equivalent per ton of coal will not be enough in some instances. Take the case of a nine-room house I know of. The gas consumption in 1916 was 202,000 c.ft.; in 1917, it was 176,000 c.ft.—showing a perceptible economy. Every precaution was taken to effect economy in gas consumption. Under the proposed conditions, I hear that this nine-room house (with over five persons resident) will be entitled to 11 tons of coal for direct and indirect use. No electricity is used. Four tons of raw coal were consumed last year. It is considered that three tons may be able to meet the case this year, if enough gas equivalent is allowed per ton of coal. Let us see how this works out. Deduct the three tons of raw coal from the 11 tons allowed. This leaves 8 tons for indirect use for gas for cooking, heating, and lighting. Thus 8 tons × 15,000 c.ft. = 120,000 c.ft., to which add (let us say) 17,000 c.ft. for lighting—in all, 137,000 c.ft., compared with the economical consumption in 1917 of 176,000 c.ft. This means that the householder will have to effect an economy of over 22 p.ct., or considerably over one-sixth, which is equal to about 16½ p.ct. Thus the gas equivalent for coal in this instance is not enough. It will lead the consumer to pin his faith rather to raw coal than to gas.

The very important matter of the punishment of offenders who exceed the rations will, it is to be hoped, receive special attention. Harsh threats will at once drive gas consumers to burn raw coal. Coal can be seen in cellars, and regulated in use so as to escape harsh treatment. Every encouragement should be given to gas consumers to turn as much as is possible of their coal ration into gas in the national interests. I should not be in the least surprised if the matter of harsh treatment had been almost entirely dropped. If a consumer is found to be wasting gas, cut off his supply. This, surely, would be punishment enough, and is a very positive way of effecting economy.

I have not yet heard that the instruction in regard to "Summer Stocking of Household Coal" issued by the Coal Control Department has been countermanded. This mischievous instruction, if not already done, should be at once withdrawn, as cellars are being filled under its operations, while gas-works are, in many instances, being starved of coal.

SOUTHERN GAS ASSOCIATION AT ILFORD AND CHINGFORD.

Favoured by glorious weather and a good programme, the members of the Southern District Association of Gas Engineers and Managers paid a visit last Thursday to the works and district of their President (Mr. W. B. Farquhar, of Ilford). Despite war difficulties, members turned up in great force, which was a good reward to the President, whose arrangements for the day, aided by his Chairman (Mr. William Ashmole) and his colleagues of the Board of the Ilford Gas Company, in collaboration with the Hon. Secretary of the Association (Mr. H. C. Head, of Winchester), lacked nothing. To a detail, there was admirable thoughtfulness in the plans.

At the Gas-Works.

Most of the members journeyed from Liverpool Street Station; and they were on the Ilford works by 11 o'clock, where the President received them; and, with his Assistant (Mr. J. T. Joyce) and the Chemist (Mr. H. Brown), he escorted the members round the works, and explained their chief features. Most of these were described in the address which Mr. Farquhar delivered when President of the Eastern Counties Gas Managers' Association in 1915. In some respects the works bear signs of the ravages of war time, through the want of labour and material; but like most other engineers, Mr. Farquhar has now to do many things that he would not ordinarily do, and he has to leave undone certain things that he would much like to do. The *débris* is seen here and there from changes which are, as conditions will allow, being slowly effected. Old plant is being renovated as much as possible, because the times are against anything else being done; and the wise engineer, as a precautionary measure, makes the best use of the wherewithal he has at disposal. The main road through the works, too, is somewhat cut-up, owing to the fact that the coal has all to be carted to and through the works. This is a matter that naturally, from the points of view of economy, convenience, and safety weighs very much with Mr. Farquhar. The explanation is that the works are only adapted for dealing with seaborne coal; there being no railway facilities whatever nearer than the station goods yard, which is situated about a mile from the works. The carting of the major portion of the coal not only means increased labour, but it does not permit of the use of all the plant and the full capacity of the stores—the stores having to be kept practically empty, so that the carts can get to the coal-elevators with their loads. The old breaker and elevator, by the way, have now companions in new ones (made by Messrs. Gibbons Bros.), with a capacity of 20 tons per hour—its predecessor having got into a somewhat infirm condition, and needing repair. The new breaker and elevator were running for the first time on the day of the visit. It was mentioned that the old elevating plant has given very considerable trouble lately; but it could not be overhauled, as it was in everyday use. Steps will now be taken to thoroughly repair and improve it. As the old elevating plant is coupled-up to underground conveyors running under the coal-stores, it will still be looked on, when repaired, as the working plant—the new set being a stand-by. The new elevator is belt-driven.

Allusion has already been made to the fact that, in the matter of general repairs, the Company are feeling the full effect of war conditions; and these, too, have hindered extension plans. The works were reaching the end of their capacity in many directions just prior to the war; and a number of new schemes had been submitted in connection with a new retort-house, coal and coke handling appliances, new works stores, new sulphate house and plant, &c. At the commencement of hostilities, however, all of these schemes had to be put aside. The Company are therefore labouring at present under conditions which the Engineer had anticipated would have been removed by now. Since the Eastern Counties Presidential Address to which reference has been made, the additional plant which has been put in is a set of new purifiers, a section of scrubbing and washing plant, a breeze-washing plant, a gas-driven gas-boosting plant, and two water-tube condensers. The purifiers are 30 ft. by 27 ft. 6 in., and at the moment are out in the open. There has been inability to erect a roof over them, although the principals are ready on the works. Shortage of labour has interfered. The new section of scrubbing and washing plant (which will deal with 3 million cubic feet per day) is not at work; but it is hoped to have it fit for next winter. The breeze-washing plant was erected by the Gordon Harvey Company; and up to the present it has given satisfactory results. The gas-boosting plant has a capacity of ½ million cubic feet per hour, and raises the pressure by 8 in. The booster is only necessary when the stock of gas in the holder is low, and there is only one lift in use. This lift throws a pressure of 4 in.; and as a pressure of at least 6 in. is required during the Sunday cooking hours, considerable trouble has been experienced on the district the past two winters. The booster is situated so as to draw from the holder, and boost on to the inlet of the station governor. The water-tube condensers were erected by the Company out of an 8 ft. diameter tower scrubber originally on the works. They will deal with 3 million cubic feet per day, and give very good efficiency.

The members saw work proceeding in resetting some of the inclined benches in the principal retort-house; and they were also interested in the extension of seven beds of horizontal retorts. This particular bench was thrown out of use about ten years ago, the intention being to dismantle it as the settings were no longer required. Circumstances, however, made it evident that the Company should utilize as far as possible whatever they had at hand; and the alteration to the bench therefore consists of taking out the back wall (which abuts on the coke yard), lengthening the retorts, and making them into short throughs. The retorts, which were originally stop-end ones, about 10 ft. long, will now be about 13 ft. through retorts. The coal will be charged from the interior of the retort-house side by a Biggs-Wall charging-machine; the coke being either pushed out or else drawn direct into the yard.

The Company have also erected an oil benzol plant; the construction and erection being executed by their own men. The oil washing is carried out in a Kirkham-Hulett rotary washer; the resulting benzolized oil being then dealt with by the distillation plant. The working of the installation has already given very good results.

The members saw and heard of these things, and inspected the plant, retort-house, carburetted water-gas, and much other plant described by the President in 1915. The interest in detail—in such matters, for instance, as the more modern introductions of breeze washing and benzol plants—was strongly manifested.

At Luncheon.

After the works, luncheon. A short walk in the town brought the members to the Cranbrook Hall, where they met Mr. Ashmole (the Chairman) and one of his colleagues (Mr. E. L. Burton). The other Directors unfortunately could not attend. Mr. G. H. S. Iorns, the Secretary of the Company, was also with the members throughout the day. The visitors were as glad to see their hosts and taste of their hospitality as the hosts were to see the members. So that after the morning travelling and works inspection, cordiality was mutual; and everybody thoroughly enjoyed the lunch, at which the President presided, with on his right-hand side his Chairman. After lunch,

Mr. Ashmole said he had much pleasure, in the name of his colleagues, in welcoming the members of the Association to Ilford. Had it not been for the war, the Directors of the Company would have been able to better entertain them. As a Board, they were very gratified to know Mr. Farquhar had been elected President of the Association. The Association had done excellent work in always looking after the interests of the gas companies and, in fact, he did not know how the gas industry would get on without such Associations as this. Mr. Farquhar would make, and he had no doubt did make, a very good President. From the Directors' knowledge of him, they knew what excellent work he did; and how thorough he was in every point of detail. He could not speak too highly of him. The Board recognized that those present had not only done him an honour by electing him President, but they had done an admirable thing for the Association. He regretted that the war had rather spoilt the effect of the visit to the Company's works. Had the war not occurred, the works would have been extremely up-to-date. Mr. Farquhar had almost fully prepared plans for making the works very good ones indeed, and up to

the proper standard; but the war had supervened. They had therefore been unable to show what they would have done had they been at peace with their neighbours.

The PRESIDENT, who was received with applause, said he merely wished to thank his Chairman for the kind words to which he had given utterance in welcoming the members. What the Chairman had said regarding himself, he (the President) appreciated very highly. His Board were very considerate in their views towards all the employees—from the officials downwards, and it was really a treat to work under and with such Directors. He would ask Mr. Doig Gibb to supplement what he himself had said.

Mr. W. DOIG GIBB said there were some words which must necessarily be spoken by someone. In short, it was his duty to express the thanks of the members of the Association to the Chairman and Directors of the Ilford Gas Company for the hospitality they had shown that day, and to assure them that they, as members of the Association, also appreciated their President, and also admired the excellent work he had done for the Ilford Company. As one who had probably seen more gas-works during war times than most of those present, he could assure the Chairman that the works of the Ilford Company bore very favourable comparison with most of the others throughout the country. There was not at these works such evidence of want of material and labour as was found in many other places. He did not say there was not any; but if there was any, then it must have been made up with the superabundance of brain power which the President and his assistants possessed. The members very heartily thanked the Chairman and his colleagues for their hospitality; and he wished them to accept their sincere appreciation of the kindness shown them that day. While they had been honoured by the invitation, they also felt pride in having been able to visit the works under the banner of a President like Mr. Farquhar, whom the members both esteemed and loved.

A DRIVE AND THE HUMPHREY PUMPS AT CHINGFORD.

After lunch and some short speeches another delightful item in the day's programme—a drive from Ilford to the Chingford pumping-station of the Metropolitan Water Board. For the drive a couple of hours had been allocated. It took rather longer—the route chosen being through an almost continuous panorama of rural beauty. Essex is noted for its topographical contrarities. Some of it is very flat and uninteresting. But across country from Ilford to Chingford, one sees its more charming and picturesque side, with its long stretches of green and wooded landscape. The end of the drive was the Chingford pumping-station; the object of the visit to inspect the Humphrey gas-pumps. The Chingford pumping-station is one of the newest of the stations of the Metropolitan Water Board; and its architect fully intended, and his intention materialized, that the buildings should be no eyesore to the district. The equipment is in keeping; and the Humphrey pumps, with their producer gas plant in a separate building, and a gasholder nestling between that building and the large pump-house, are altogether novelties, and a combination which marks real engineering progress. Boilers and chimney stacks are not an accompaniment of this pumping plant; and to-day everything looks as new and spick-and-span as when the buildings were erected and the plant put in. And the plant is something which incorporates bold imagination and much engineering ability. The idea of making the explosive force of gas acting direct upon a body of water to move and lift it, without the intervention of moving parts between the force exerted and the water, is one that appeals to the engineer. Hence the crowd of interested gas men who heard the explanations of the engineer at the station. The pumps have been fully described on previous occasions in the "JOURNAL;" and it speaks well of their work when it can be said that neither Mr. H. A. Humphrey, the inventor, nor any of his assistants, have had occasion to visit the station during the past two years. Each of the pumps has a capacity of 3000 gallons per explosion; and with eleven explosions per minute this means 33,000 gallons per minute. The capacity of the pumps was originally based on the maximum requirements; so that no additions or developments are anticipated.

Having inspected the station plant and reservoir, the members had a cup of tea—one of the many attentions of the President during the day—and were soon on their way back to Enfield Lock Station, thence homeward bound, feeling that they had spent a day (not without technical interest) which formed a good break from the worries and dragging influences that now on every side assail every day's work, with no immediate prospect of ending.

NOTES ON THE PROPOSED JOINT INDUSTRIAL COUNCIL FOR THE GAS INDUSTRY.

By S. TAGG, of Preston.

[Submitted at Last Week's Meeting of the Manchester District Institution of Gas Engineers. See p. 423].

In view of the important part which joint industrial councils are likely to play in the future economic life of the nation, the suggestion of the Minister of Labour that the National Gas Council should consider the advisability of forming a Council for the gas industry demands the serious attention of all interested.

In order to clearly understand the purpose industrial councils are intended to serve, the Industrial Report No. 1, containing the recommendation of the Whitley Committee, with an explanatory letter by the Minister of Labour, and Report No. 2, on the constitution and working of works committees, should be carefully considered. The complexity and importance of the proposals are such as to render a brief summary impossible; but attention is drawn to the following points as possessing immediate interest.

(1) That industrial councils shall consist exclusively of representatives of organizations—*i.e.*, trade unions and employers associations.
(2) Where an industry is distributed over the country, district joint councils will be found necessary.
(3) Where circumstances permit, further decentralization is provided for by the establishment of works committees.
(4) Where a small number of craft workers not confined to one industry are employed that their interests be dealt with by sectional joint committees.

The Ministry of Labour have prepared suggestions as to the constitution and permanent functions of a Joint Industrial Council; and with their permission the following have been extracted as applying to the proposed Council for the Gas Industry.

Attention is first of all drawn to a statement of the Minister of Labour, that "the Government desire it to be understood that the Councils will be recognized as the official standing Consultative Committee to the Government on all future questions affecting the industries which they represent."

SUGGESTED FUNCTIONS OF COUNCILS.

(1) To secure the largest possible measure of joint action between employers and workpeople for the development of the industry as a part of national life, and for the improvement of the conditions of all engaged in that industry.
(2) Regular consideration of wages, hours, and working conditions in the industry as a whole.
(4) The consideration of the existing machinery for the settlement of differences between different parties and sections in the industry, and the establishment of machinery for this purpose where it does not already exist, with the object of securing a speedy settlement of difficulties.
(12) Representation of the needs and opinions of the industry to the Government, Government Departments, and other authorities.
(14) The consideration of the proposals for District Councils and Works Committees put forward in the Whitley report, having regard in each case to any such organizations as may already be in existence.

The formation of a council for the gas industry is affected from the employers' standpoint by the division of control between private companies and local authorities. In the case of the latter, the question arises whether separate councils should be formed for each undertaking within their control—*e.g.*, gas, tramways, electricity, &c.—or, in the case of the larger corporations, one council consisting of the corporation as employer and various trade unions representing the employees. This point is receiving the consideration of the Association of Municipal Corporations; and, at the request of the Ministry of Labour, the National Gas Council have deferred any further action until their decision is announced.

In the event of separate councils being established for each department, some co-ordination would be necessary to ensure a common basis in the fixing of wages and other conditions of employment. Gas companies would then have the alternative of merging their interests with local authorities or else of forming a separate council. The position would require careful consideration to determine the effect on co-partnership, private legislation, and other questions in which the interests of corporations and companies are not identical.

In any case, the constitution of a joint industrial council for all public-utility services would differ from those for industries of an ordinary commercial and competitive character. While it is stated that nothing in the nature of compulsory arbitration is intended under the scheme, it may be necessary that differences on wages questions, &c., should be referred to some Government Department.

The formation of district joint councils appears particularly applicable to the gas industry; and as the undertakings included vary so greatly in size, a further division into two groups of over and under an output of (say) 100 millions may be desirable.

The reports on works committees is generally favourable, as leading to better understanding between employer and employed; and this is confirmed by the experience of co-partnership committees. Joint industrial councils are, however, only a means to an end; and if permanently improved relations between capital and labour are to be secured, both parties must be prepared to make sacrifices.

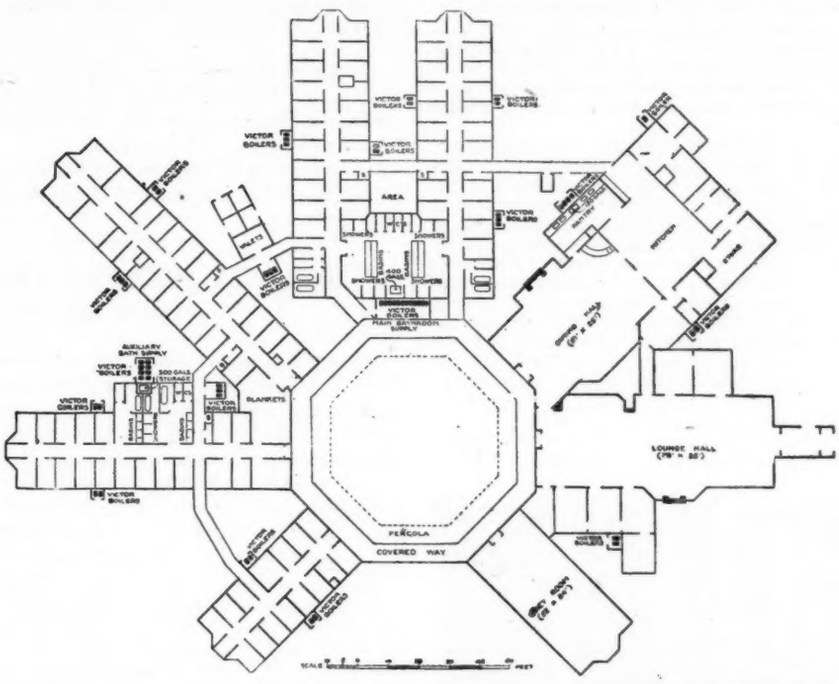
While serious differences will inevitably continue, there is reason to believe the proposed councils will eventually benefit all parties; and in this connection the recent address of the President of the Union of General Workers, who is rendering invaluable service to the country in another capacity, should be carefully studied.

The Illuminating Engineering Society of America recently held a Council meeting at which the Committee on time and place for the annual convention made a tentative report. The members of the Committee expressed the opinion that the usual annual convention, including the entertainment features and excursions, was undesirable at this time. The consensus of opinion seemed to be in favour of a short technical session. The Council approved the report, and decided upon a one-day technical session, consisting of papers on lighting subjects pertaining to the war.

A COMPLETE GAS-HEATED WATER SYSTEM

In an American Officers' Hostel.

DURING the past few months, the gardens of a certain London Square, have undergone a transformation from the purely ornamental state to the eminently useful, though it must be admitted that in the process they have lost little, if any, of their original attractive appearance. To say this much is mere justice to those who have been responsible for the change; at the same time, it should be added that the end in view would have warranted even the spoiling of the beauty of the gardens. Where four months ago all was grass, trees, and shrubs, there is now to be seen an American Officers' Hostel, complete in every respect, and designed (for the American Committee of the Y.M.C.A.) to meet the exigencies of the special circumstances. These special circumstances are several in number; and among them is one of peculiar interest from the gas engineering standpoint—*i.e.*, the banning by the residents controlling the use of the gardens of the consumption of coke or any other form of solid fuel.



S. Phillips-Dales, M.S.A., Architect.

Block Plan of Buildings.

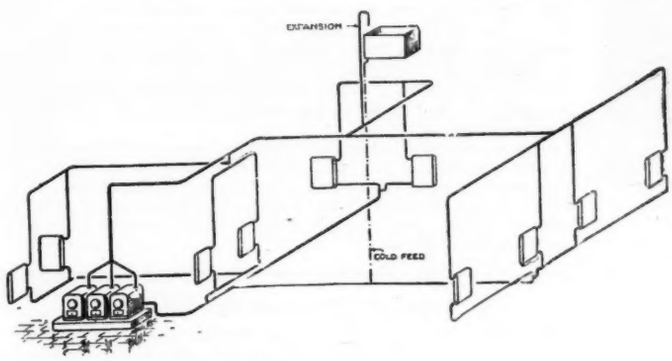


Diagram of One Heating Unit.

In the short time named, buildings have been erected, upon the designing of which there was brought to bear the extensive experience already gained in connection with similar work by Mr. S. Phillips-Dales, M.S.A., of No. 63, High Holborn, W.C., the Consulting Architect to the National Council of Y.M.C.A's., to whose courtesy we are indebted for the facilities which enable a description to be given of what has been done, so far as it is of special concern to "JOURNAL" readers. It must, in the first place, be explained that the buildings provide bedrooms for a hundred officers, with bath-rooms attached; a kitchen block, with dining-room; a lounge and recreation rooms of the usual kind; and the accommodation requisite for the residential staff, valets, &c. Everything is on one floor; and to meet the lay-out of the gardens, the huts are planned with a central main connecting corridor arranged in hexagonal form (as will be seen from the plan), having seven wings radiating from it, while auxiliary passages between the various blocks are provided for staff purposes at the rear.

As solid fuel was out of the question, for the reason already given, a complete scheme of gas heating has been carried out; the difficulties, from the heating engineer's point of view, that are inseparable from a bungalow site covering so extensive an area having been successfully overcome, with the aid of Mr. Thomas Potterton, of Cavendish Works, Balham, S.W., whose system is admirably adapted to such a purpose. For the warming of every bedroom and of the bath-rooms, low-pressure hot-water circulation,

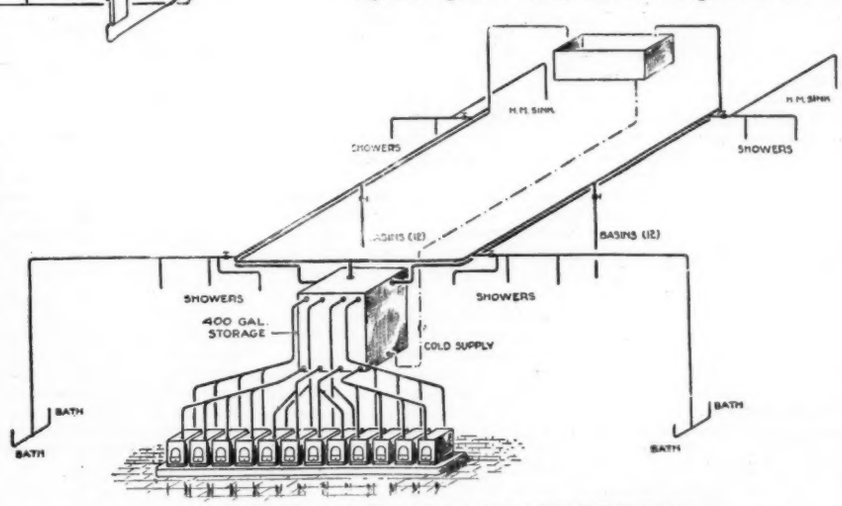
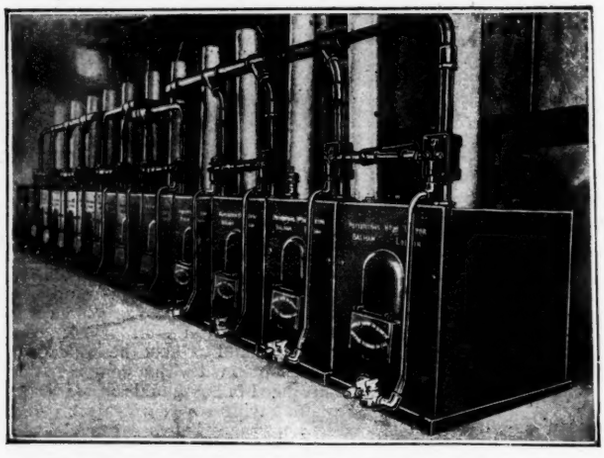


Diagram of Hot-Water Supply in the Principal Bathroom.

with radiators, has been adopted, with "Victor" gas-boilers accommodated externally in huts adjacent to the respective positions of the radiators; while for the central corridor, the lounge, and other large recreation rooms, gas-heated steam-radiators are provided—supplemented by a gas-fire in each of the three big rooms. The wisdom of the choice of method made is apparent. Had a central system been desired, it would have been impossible to place the heating chamber, with its chimney, anywhere near the centre of the buildings; and even an accelerated system, with pumps, would necessitate a considerable amount of piping, both overhead and trenched, thus tending to increase the difficulties from an architectural standpoint. On the other hand, one of the great advantages of the form of gas heating adopted is that the work is divided into comparatively small units, with the boilers placed close to their duty, so avoiding the use of large circulating mains and extensive runs of external pipes, in which indirect losses occur.

The four large bedroom blocks, together with the staff rooms and offices adjacent to the recreation rooms (the cubical contents of which are 190,000 ft.), are heated by hot-water circulation, in the manner indicated. The heating plant—apart from domestic hot water supply—is divided into sixteen sections, with twin boilers, or batteries of three, proportionate to the amount of heating surface on the respective units. The heating surface in the radiators, which number in all 137, amounts to 3870 sq. ft.; while the heating mains and branches (all of which are available for warming with the radiators) represent 1430 sq. ft.—making a total of 5300 sq. ft. in the blocks named. The plant is designed on a liberal basis of heating surface, having regard to the construction of the buildings, and the high temperature usually favoured by most Americans. It further enables the systems to be operated at a moderate temperature, which tends to economy in fuel.

An emission of 954,000 B.Th.U. hourly is estimated to occur from the whole heating system, when the thermometer stands at



Battery of 12 "Victor" Boilers for the Main Bathroom Supply.

30° Fahr., or thereabouts. This would gradually reduce as the heat in the huts rose. The boilers, numbering 36, have a total output of 1,120,000 B.Th.U. hourly, a portion of which is under thermostatic control, reducing the heating capacity to 64,000 B.Th.U. when the radiators and circuits have reached the normal working temperature of 150° Fahr. Below this point, the regulation is accomplished by hand; a Resident Engineer being in charge of the installation. Owing to the whole of the plant being on one floor level, the drop system has been adopted in all cases for the heating circuits; and an example of one section is shown in one of the diagrams.

Coming now to the domestic hot water supply, it may be stated that this is divided into three sections—one being for the kitchen and scullery sinks, and two for the bathrooms, lavatories, and housemaids' closets. The culinary section has to supply four sinks in the scullery, and two sinks in the kitchen, for which a 150 gallon storage cylinder is provided, with a battery of four No. 20 "Victor" boilers. This combination has an output of 130 gallons of high-temperature water (at, say, 150° Fahr.) per hour; while the storage, being slightly in excess of this hourly output, contains a margin of capacity for extra demands.

The plant installed for the main bathroom supply, of which a diagram is given, comprises a battery of twelve No. 20 "Victor" boilers, with a 400 gallon storage tank; secondary circulations being carried in two directions owing to the large distribution of the taps. In all, there are ten shower baths, four private baths, twenty-four hand basins, and three housemaids' sinks. This bathing centre has to provide about two-thirds of the washing accommodation; possibly about sixty persons using the baths, for which 400 gallons of water, at an average temperature of 150° Fahr., is always available hourly. This, for bath purposes, having cold water added, would produce about 600 gallons of water at (say) 100° Fahr.

In the auxiliary bathroom the plant consists of a 300-gallon storage tank, connected to a battery of eight No. 20 "Victor" boilers, with secondary circulation carried as near as possible to the points for supply. As in the case of the principal bathroom, there are both shower and private baths, in addition to lavatory basins and sinks; the output of high-temperature water (at, say, 150° Fahr.) being 260 gallons per hour, equal to about 390 gallons with cold water added to yield 100° Fahr., which is a suitable temperature for bathing purposes.

In all cases the hot-water storage tanks are fitted in the bathrooms and scullery, where they can be utilized for towel drying; while for the blanket store adequate warmth for airing purposes is maintained by means of hot-water radiators supplied from one of the heating units.

Apart from the hot-water supply which is specially dealt with here, it may be remarked that the hostel is well equipped with gas-cooking apparatus, gas-fires, and radiators made by Messrs. John Wright & Co., of Birmingham.

This portion of the scheme, together with the meters and gas mains, has been arranged and installed by the Gaslight and Coke Company.

COKE-OVEN MANAGERS' ASSOCIATION

(NORTHERN SECTION).

During a visit to the Marley Hill coke-ovens and bye-product works of Messrs. John Bowes and Partners, Ltd., the Manager (Mr. William Diamond) informed the members of the Northern Section of the Coke-Oven Managers' Association that it is the general practice of the firm to compress all the coal before placing it in the ovens; top-loading being only resorted to in case of a severe breakdown, when it was desired to avoid reducing the output. Practically all the coke produced is therefore compressed. It is of average quality, and has approximately 8 p.ct. of ash.

The gas is conveyed from the ovens by cast-iron pipes, in which the tar is deposited by natural condensation and from which it is collected in sumps. After passing through air and water coolers, it is treated in an exhauster, compression in which has the effect of increasing the temperature by about 8° from 70° Fahr., a circumstance which militates against the efficiency of ammonia and benzol absorption. It is therefore passed through another condenser before being treated in scrubbers for the extraction of ammonia and benzol, after which it passes on to heat the ovens. The surplus gas and waste heat generate steam for the working of the bye-product and coke plants; surplus steam being consumed in a 600 K.W. turbo-generator, whereby sufficient electricity is generated to supply all the requirements of Marley Hill and Byermoor collieries, in addition to working several motors on the bye-product and coke-oven plant, where most of the machinery is motor-driven.

The ammoniacal liquor recovered in the scrubbers is conveyed to sulphate of ammonia plant of the Wilton type, in which good grey sulphate of ammonia is produced. As an alternative, a concentrated liquor plant, designed by Mr. Diamond himself, has been erected, wherein liquor of any desired strength—usually 25 p.ct.—can be produced.

Cracking Oil in Coal-Gas Retorts.

Results of cracking oil in coal-gas retorts, recovering the light oils, and selling the gas for commercial purposes were given by Mr. C. D. Shaul, in a paper submitted at the annual convention of the Illinois Gas Association. Three years ago, the Citizens' Gas and Fuel Company of Terre Haute (Ind.) began to treat oil in fourteen benches of six retorts. The gas oil is fed to the retorts by a pump; regulating valves being provided so as to allow it to flow at any desired rate through sight-feeds into funnels attached to U-seals. The seal is connected by ½-in. pipe to the mouthpiece of the retort; entering a 4-in. vapour pipe lying on the bottom, and running to the rear of the retort. On reaching this pipe, the oil is vaporized; and the vapour flows out at the back end into the retort, where it comes into contact with the retort-walls, at about 1300°. There result numerous and complex chemical changes in connection with the various hydrocarbons, depending to a great extent upon the length of time that the oil vapours are subjected to heat treatment, and the temperature, as well as upon the character of the original raw oil. The temperature of the hydrocarbon gases and vapours passing from the retorts is so high that all of them are carried along in a gas and vapour form to the condensing apparatus, which removes a large quantity of light oil. The remaining vapours are absorbed in a rotary scrubber, by means of wash-oil. From this point the gas of 1300 B.Th.U. is taken through purifiers, and then diluted with blue gas at the holder inlet. The wash-oil is circulated through a continuous still, and the light oil extracted. The blue gas is of about 300 B.Th.U.; and the two are so mixed as to produce a gas of 600 B.Th.U. The change from the coal and water gas mixture to this new mixed gas was made, and the new gas distributed, without complaints, and without the consumers knowing a change had been made.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

QUARTERLY MEETING AT MANCHESTER.

The One-Hundred-and-Eighty-First Quarterly Meeting of the Institution was held last Wednesday, in the Midland Hotel, Manchester; the chair during the formal part of the proceedings being taken by Mr. W. WHATMOUGH, of Heywood (last year's President) until the arrival of the new President, Mr. J. P. LEATHER, of Burnley, who had been delayed by sudden indisposition. There was a very good attendance of members; but disappointment was expressed when it was announced that neither Mr. S. Tagg, of Preston, nor Mr. H. Kendrick, of Stretford—who figured on the *agenda* in charge of important subjects for discussion—would be able to attend, the former being detained on important negotiations in London, and the last-named by the exigencies of his professional duties.

MINUTES OF THE LAST MEETING.

The HON. SECRETARY (Mr. G. S. Frith) read the minutes of the last meeting; and they were confirmed, on the motion of the CHAIRMAN, seconded by Mr. HAROLD DAVIES (Brighouse).

CONDOLENCES.

The CHAIRMAN said his next duty was a sad one. At the last meeting of the Council they passed votes of condolence, on behalf of the members, to Mrs. Kent, on the death of her husband, Mr. F. Kent, of Worksop, and to Mrs. Furness, wife of the late Mr. John Furness, of Slaithwaite. In accordance with custom, the action of the Council required the sanction of the meeting. He moved that this be given.

The vote was agreed to in silence, the members rising in their places.

INVALIDS.

The CHAIRMAN said there was another matter which he thought they ought to refer to, and that was the illness of their esteemed Hon. Treasurer, Mr. James Braddock, of Radcliffe, who had not been very well lately. Mr. Braddock had undergone one operation, and would shortly have to undergo another. It would be very nice if they could send a message of sympathy to him in his illness, and best wishes for his speedy recovery. They might also send a similar message to Mr. F. L. Wimhurst, of Newcastle-under-Lyme, and to Mr. Fred Thorpe, of Colne. Mr. Thorpe had undergone two operations, and was lying on a bed of sickness.

Mr. J. E. BLUNDELL (Macclesfield) moved that messages be sent; and this was agreed to.

LETTERS OF REGRET.

The HON. SECRETARY read a number of letters of regret for non-attendance, these including one from Mr. S. Tagg, of Preston, enclosing copies of his *résumé* of the reports of the Whitley Committee for distribution among the members. Mr. Charles Wood, of Bradford, apologized for his absence, by explaining that the King and Queen were visiting the Woollen Metropolis that day.

FIVE NEW MEMBERS.

The CHAIRMAN extended a hearty welcome to five new members of the Institution—viz., Mr. C. Rhodes Armitage, of Lancaster; Mr. J. R. Bradshaw, of Retford; Mr. Arthur I. Jones, of Holyhead; Mr. Alex. MacKay, of Stoke-on-Trent; and Mr. Charles E. Teasdale, of Salford.

At this stage, the President (Mr. J. P. Leather) took the chair.

JOINT INDUSTRIAL COUNCILS.

The Hon. Secretary, in the absence of Mr. S. Tagg, read some "Notes on the Proposed Joint Industrial Council for the Gas Industry" prepared by that gentleman, which he had expected to be able to introduce personally—see p. 420.

The PRESIDENT said he was exceedingly sorry Mr. Tagg was not with them to present the question personally, although he had done so well in sending the notes which had just been read. But if Mr. Tagg had been with them they would not only have had the advantage of listening to a man who had studied this matter considerably, but to one who was able to express in very clear language the thoughts they themselves were thinking. It was impossible to hide from themselves the fact that they were entering upon a new era. The old system of trade guilds broke down long ago, and yielded in the Nineteenth Century to an individualism of which the god was competition, and its watchword "Every man for himself, and the devil take the hindermost." From this had developed a collectivism which still retained the worst evils of individualism. Combines among traders and manufacturers ruthlessly crushed out the smaller and weaker firms. Combinations of employers and combinations of employed, respectively, engaged in a warfare with one another, each side seizing upon any opportunity to gain an advantage for themselves, regardless of the public interest. It rested, therefore, with those who could detach themselves from party and self interests to seek a solution of this difficulty by a free interchange of thought between sections of the community now in opposing camps. Taken by itself, the gas industry might well be considered one of the best to provide the men of light and leading to this end. They had long recognized the community of interest between producer and consumer; and the most successful cases of co-partnership between employer and employed had been those connected with the gas profession. There were, however, certain difficulties alluded to by Mr. Tagg which arose from their connection with municipalities. He thought it should be understood that the settlement of wages was not the only function of the proposed Industrial Councils. It loomed large in their minds at the present time, though he thought eventually it would be found that other of their functions would exercise an equally important action on our national life. In the meantime, the Industrial Councils, or, if they are not formed soon, the Interim Reconstruction Committees would be absolutely necessary in order to deal with demobilization and reconstruction. The close connection, particularly in the north part of the country, between the public-utility services in the hands of local authorities suggested that while Industrial Councils might work for most purposes separately—for gas, electricity supply, tramways, water supply, road construction, and sanitation—they might, in case of special need, meet in joint session as a Public Utility Council, either nationally or by district. This suggestion, however, did not quite come out in Mr. Tagg's notes. He alluded to the difficulties attendant upon divided control between private companies and local authorities, and suggested that there might be separate councils for each undertaking within their control—gas, electricity, tramways, &c., But he (the speaker) did not think that this would work particularly well. It would mean that the gas companies (which among them were in comparatively small number) would be dragged at the heel of the municipalities. It seemed to him there must be separate councils for gas, even if there must be a certain amount of collusion between them and the other public-utility undertakings. No doubt there were many members present who had read the Whitley reports, and the rather long report sent out by the National Gas Council; but in these days one did not always find time to read everything.

At the call of the President,

Mr. S. MEUNIER (Stockport) said a study of the Whitley reports and a study of the situation and the working would have made him feel inclined to think that if they were to progress in the future they would have to alter very considerably the lines they had followed in the past. Whether they liked it or not, undoubtedly the Whitley reports had laid a foundation which the Government intended to follow. Therefore, whether they could agree with all the points they had laid down and the suggestions they had made, or whether they didn't, it appeared to him that they must take them into full consideration and try to evolve something from their own direct experiences in their own particular sphere, so as to fall into line rather than be forced into line. He was a great believer in the wisdom of that famous fable, the "Bundle of Sticks." So far as their experience in the past and in the present was concerned, they had been rather divided houses. They had had the men on one side pulling for all they were worth, and, as the President had so well put it, "Every man for himself, and the devil take the hindmost." On the other hand, they had had the masters—especially the municipal authorities—trying to get off with as little as they could. This was not for the good of the country; and if the war had not shown anything very much, it had shown the necessity of unity of purpose and unity of action. From this point of view, it appeared to him that they must endeavour to pull themselves together, to get their workmen into line with them, so as to achieve and obtain the best possible results in every way. It was impossible to do this without co-ordination between the employer and the employee. They must take the employee into their confidence to the point of showing him the absolute importance of pulling together to achieve the highest and best results. At the same time, the employers must be prepared to face the fact that co-ordination with them on the employees' part must be paid for, and paid for in a different way from that holding good in times past. They knew very well the trade union fetish that every man must be paid a standard rate, and they knew very well, too, what an utter failure this had been in the past. They knew very well, also, that a similar line of policy in the future would not hold good, and would not achieve what the Government had in their minds, based on the reports of the Whitley Committee. They had to pay a man something for his ability and his intention to work; and to do this they must have a round-table conference between representatives of the men and of the employers, each—and this was a great point—thoroughly understanding what they were talking about. He said this advisedly, for this reason: Many of the questions which were being discussed to-day, at any rate on the part of the gas departments, by men—wise they might be and good, clean business men—who knew nothing of the practical work, who were rather fond of airing their views and making suggestions in the absolute absence of advice or any information which their own heads of departments could give them. To this extent, therefore, the formation of either district councils, or national councils, or sectional councils could only be a failure unless on these various councils were represented the men who know—the men who had practical experience—and the men who could suggest how the various points of opinion which were continually arising between men and employers were best solved. They had to face the fact that the war had made many things clear which in times past were very dull. They also had to face the fact that if they were to continue to exist—not only as a country but as individual departments—they must put forth the best they had in them, and they must have co-ordination of the workpeople, giving the best in them. This was a perfectly well-known fact to them all; and he was quite certain that each of them could a tale unfold about the men in their employ—where one man was willing and able and another man would do as little as he could, although he might know a great deal. He was of the candid opinion that where corporations and gas companies and their representatives found the capital, the workman found his capital,

which was his knowledge of how to do his job, his ability to do it well, and his energy to put in all he had in him, if he felt so disposed. It was this disposition they wanted to try to foster; and it could only be done by a round-table conference, which was the foundation of the Whitley reports. With this capital of his, what did the workman get to-day? The trade union rate of wages, which was equally applicable to the good and to the bad man. A round-table conference would solve this difficult problem, and enable them (as employers) to co-ordinate with the men, and to evolve some principle in which this capital of theirs was paid for in the way of some token or dividend. Then he thought they would get the best the workmen were capable of, which he was sorry to say they were not getting to-day. From this point of view, therefore, he thought the Boards or Councils ought to be formed; and the sooner they put their houses in order, as far as the Manchester Institution was concerned, and the sooner they tried to form district boards (and after all in the gas profession local circumstances were so varying), the better, because he considered a National Council could not carry out the work to the extent they would like. He strongly suggested the formation of district councils, where every district, knowing its own circumstances and the requirements of its people, could evolve a principle which in practice would be a real help to the Government in its particular district. This, once done, would be a help in many ways; and the different points affecting the whole industry could be supplied to the National Council. For the many interests that had to be taken into consideration, and to get the best results all round, he was strongly of opinion that district councils should be formed. He considered that the workmen were entitled to more than they had had in the past; and though they might hear a little more about profiteering just now, he was perfectly certain that British workmen had very strong feelings of national pride. If they could by any means let them grasp the point that they meant to do well by them, they would, in their turn, do their best. By the friendly feeling which would arise between employer and employed through the parties being brought into close touch with one another, everyone would put his heart into the concern; and the result would be that Britain would be lifted into the position it held many years ago, and which had now largely gone. He advocated that steps should be taken as early as possible in the Manchester Institution district to see if they could not formulate a body which he was certain would be met half-way by the men's representatives.

The PRESIDENT asked whether anything had been done in the Leeds or Bradford districts.

Mr. R. WATSON (Doncaster) thought it would be useful to bear in mind the terms of reference to the Whitley Committee. In view of the experiences which they had all had the past year or two, and apart from the mere equity of the claims which workpeople might have, and with which most of them would probably agree, some such scheme as suggested by the Whitley Committee was eminently desirable. While he had not gone through the whole of the report, he thought, from what he had read, that Mr. Tagg had admirably condensed the chief points for their consideration. The details it was as yet too early to discuss; but the industry would undoubtedly benefit by the adoption as a principle of the whole of the Whitley Committee's report. He did not know whether it was their object to back up the National Gas Council in anything they might suggest; but it was desirable that they should fall into line with other people who were going to adopt the same thing.

The PRESIDENT said they were in a little difficulty at the present moment; and that was the one referred to by Mr. Tagg—that the Ministry of Labour wished the National Gas Council to ask everyone throughout the gas industry to consider this question. But they afterwards sent a letter round saying: "Please defer consideration for the present"—this being apparently due to the fact that the municipal corporations were considering it, and they wanted to see what sort of conclusion they would come to with regard to other public utility undertakings. There were undoubtedly many difficulties in their way; and they had all experienced some of them lately. Especially had it been impressed upon them that the gas industry was not definitely one body. For instance, they had men receiving awards under the engineers' awards, and others as gas workers, quite separately. His own Gas Committee had frequently given utterance to the view that some sort of method was necessary, without any reference to the Whitley report, which had not been discussed by them. Perhaps all they could do that day was to express the opinion that the National Gas Council ought to do something on the lines indicated by the report, and leave it to their own Council to formulate some scheme, because the letter sent out by the National Gas Council said if they did not do something they (the National Council) would. This was not said in any threatening way. But they would be bound to do something; and it would be better to do it themselves than have it forced upon them by the Government.

Mr. MEUNIER said the letter from the National Gas Council was considered by his Committee, who, while not binding themselves down to any line of action, approved the idea, and were prepared to go through with it. On the other hand, he heard that the engineers of the Manchester district had already formed a board for the settlement of wages; and this board was working amicably and well, irrespective of the Committee on Production. All wages questions were settled between a joint board of masters and men; and it had worked very well indeed for some little time. Therefore it did not seem such a difficult question. He would like to offer for the consideration of the meeting the advisability of taking a similar step at once, and approaching the undertakings they represented with a view to sounding them on the point of forming these boards—not forgetting that on the boards the professional adviser to the corporation should be one of the representatives. He threw this out as a suggestion, because the sooner they moved the sooner would they arrive at some definite understanding. He was perfectly certain that the different unions which represented the men would only be too glad to do the best they could to form a board to go into the various points which might arise, and to assist in formulating a solution. He, therefore, proposed: "That this District Institution approach the various undertakings which they represent, both corporations and companies, with the view to enlisting their sympathy and their help in the formation of such a District Board." The Manchester district covered a wide area; and he thought it might easily be divided into two, as in the case of the Commercial Sections—*i.e.*, Yorkshire and Lancashire—with the view of trying to form a board for each district, because the circumstances varied.

Mr. WHATMOUGH said there was one point with reference to Mr. Meunier's suggestion which struck him, and it was this—that when they went to their committees the committee liked to have a definite suggestion before them. They (the members of the Institution), as practical men, and as the men who had to work these things, would appreciate the difficulty of going before a committee without a definite plan. He therefore thought it would be better if this subject—which was so difficult and complex—could be referred to the Council of the Institution, who, if necessary, might be empowered to add to their number anyone who happened to be an expert on any particular subject; so that, if necessary, he (the expert) could go before the Board and explain the matter to them. This would be more satisfactory to themselves in carrying out the work.

Mr. HAROLD DAVIES (Brighouse) said clause 14B of the Whitley report placed distinct emphasis on the formation of works committees. In his opinion, works committees were the first essential in starting the scheme of industrial councils or committees. He considered that district committees were the second step in the line of action, and would no doubt be helped forward by the works committees, who, in his opinion, should have some voice in the election of such district committees. He suggested that they should ask their respective undertakings to take the first step, and then the essential district committees would follow as a sequence. As things stood at present, they were beginning half-way.

Mr. W. T. BUCKLAND (Chesterfield) expressed cordial agreement with Mr. Meunier's suggestion concerning the advisability of setting-up round table conferences in the first place. It had been found, in experience, that it would be desirable to have district committees soon, because, as matters stood at present, members of a trade union, whether gas or electricity, came out in sympathy with one another—if the gas stokers came out the electricity stokers did also, and so on. Difficulties arising in this way would be eliminated by the works committees.

Mr. W. B. M'LUSKY (Halifax) said they had had five months' experience of the scheme at Halifax, and had held monthly meetings. The Works Committee—which they started right at the beginning—was composed of eight workmen and eight Gas Committee men. They did not discuss wages, but questions of labour and other matters of works importance. In practice, they found the "Whitley Committee" at Halifax was a very strong support to the Gas Committee. When they met in committee, the Gas Committee did not sit on one side of the table and the men on the other; they sat in alternate chairs. This enabled the members to meet on a level; and the result had been found most satisfactory. The Committee was purely consultative, not administrative; and, so far as his experience of it went at Halifax, he did not anticipate trouble, as they would be able to settle any differences once a month.

Mr. W. B. SMITH (Bolton) asked who was going to determine the wages question if the "Whitley Committee" was not going to discuss the matter.

The PRESIDENT said that, as there was no seconder to the resolution, he thought they had better leave the matter to the General Council to consider it. The letter from the National Gas Council asking for its postponement was really due to the Ministry of Labour; but as soon as possible, he would see that the Committee did meet.

Mr. MEUNIER said he should certainly object to a local matter of this kind being dealt with by the Council of the Institution, as suggested Mr. Whatmough.

Mr. WHATMOUGH said his reference was to their own Council, and to no other.

Mr. MEUNIER intimated that he was quite willing to fall in with the suggestion that the Council should consider the matter; and with this understanding the discussion terminated.

TECHNICAL LIBRARIES REPORT.

The PRESIDENT said they seemed to be unfortunate in their arrangements that day, inasmuch as Mr. H. Kendrick, of Stretford, who should have introduced this question, was unable to be present on account of a Board meeting.

The HON. SECRETARY then read the reports which had been prepared by Mr. Kendrick, comprising a general statement of the position of the matter, together with an additional statement presented to the Libraries Committee of the Manchester Corporation by the representatives of the Technical Societies of Manchester.

The statement in favour of the proposed technical library, presented to the Libraries Committee of the Manchester Corporation by the representatives of the Technical Societies of Manchester, stated the opinion that the provision of complete technical libraries is essential in all the industrial centres of Great Britain, in which case the scheme becomes both a national and a district one, and, in their view, should receive support from national funds. It appears to them that the suggestion of a Manchester District and National Technical Library, with Government assistance, offers the most promising prospect of a satisfactory solution of the problem. They concluded: "The Patent Office Library in London is a recognition by the national authorities that such a library is essential; and we feel that even greater claims can be put forward for the establishment of similar institutions in the various important industrial centres. We suggest that the co-operation of the other large industrial centres should be invited, with a view to bringing before the Government the urgent necessity of an adequate provision of technical libraries throughout the country. The Government have already allocated the sum of £1,000,000 for industrial research; and it is reasonable to expect that they may support a scheme which, at relatively small expense, will make research work much more effective. In connection with any technical library which it may be decided to form, we suggest that special facilities should be granted to, and reading-rooms provided for, persons wishing to use the library for *bonâ-fide* study and research work, in addition to the ordinary facilities and reading-room provided for the general public."

The PRESIDENT said it was evident when one heard the figures that we were doing very little compared with some countries. It meant, of course, Government support to do anything at all considerable;

but the whole question would doubtless receive proper attention at the hands of the various Industrial and Reconstruction Committees which were being set up. What was really intended that afternoon was simply to report what had been done.

On the motion of the PRESIDENT, the Library report was accepted, with the heartiest thanks of the members to Mr. Kendrick for preparing it.

THE GAS RATIONING ORDER.

The PRESIDENT said the only other item they had on the *agenda* was he Lighting, Heating, and Power Order, 1918; but it was an exceed ingly important item, for this reason—that the Order was not yet decided upon, and all communications that had been made about it were of a confidential character. Informal suggestions in regard to the rationing of gas, coal, and electricity had been under the consideration of the National Gas Council for some time. A general outline of the proposal was drawn up about three weeks ago in a confidential document; but it was not allowable or desirable that the matter should be published in the Press, because it was not a final document. It was, however, hoped that the amendments to the proposals would be decided upon without delay. Several meetings had taken place; and the Advisory Committee appointed to meet the Coal Controller had informed him that the proposals he had formulated would not meet the desired end, and that the scheme was not workable. They (the Advisory Committee) suggested another scheme; and another Committee was appointed last week to work out the details. The Committee referred to consisted of only four gentlemen, two of whom were Mr. Tagg and Mr. Bloor, of York. He should like to testify to the great indebtedness of the gas industry to these two gentlemen for the very able manner in which they had placed the case before the Coal Controller—a case not resting upon the interests of the gas industry, but on national interests throughout the piece. He assured them that the best that possibly could be done had been done; and if he did not speak as plainly as some of them would like him to, he asked them to remember that the negotiations were incomplete, and that therefore his position was a very difficult one.

Mr. MEUNIER said that although the information was confidential, still they had some opinion in the "GAS JOURNAL" that day; and they also had a suggested scheme by someone who had written to "The Times." He quite agreed that they could not very well discuss a proposal until it was made. So far, however, as one could judge from the tendency of the negotiations as they were known, they were not going to be very satisfactory to gas departments; for, as the "GAS JOURNAL" had wisely pointed out, "the very first consideration in fuel rationing and allocation should be national service" [a reference to an Editorial note in the last number of the "JOURNAL," under the caption "Unconscious Rationing of the War Departments."]. The Manchester Institution Commercial Section had this matter up for discussion on Tuesday last, and—he was allowed to say this for the information of the members—after a lengthy consideration they decided that some steps should be taken before the Order was issued, and as far as possible to back-up the letter of the Commercial Section of the Southern District Association of Gas Engineers and Managers [*ante*, p. 387.] at the meeting of the Institution of Gas Engineers in London next week. It was decided to write to the Southern Association and ask them to raise the point on the report, and draw attention to the importance of the matter to the country as well as to gas undertakings, and to promise them, so far as the Manchester Commercial Section was concerned, every help and support. It was also decided that other Associations should be communicated with, with the same object in view—not to let anybody and everybody speak, but to raise the various points which they felt were important at the Institution meeting, so as to try and influence the deliberations of the Coal Controller before the Order was issued. He hoped some good would result from their joint efforts. At any rate, the matter was too important to be allowed to slide until the Order was issued and then to discuss it—when it practically became a law which they were bound to carry out. Therefore, he thought the members might like the information as to what the Commercial Section were doing. He further suggested that an expression of opinion from this (the Manchester) meeting, somewhat on the same lines, would not be detrimental, but would help.

Following a confidential statement by the PRESIDENT,

Mr. HAROLD DAVIES said the gentlemen who represented the gas profession before the Coal Controller and the Board of Trade were very able men, and they recognized that at the present time the Coal Controller had all the facts before him in every particular case, and that, so far as he could, he was out to help the gas industry and not to hinder it. To this extent he did not think they would be helping the members of their Association, who were up in London at the present time endeavouring to produce some scheme which would be workable to the best possible extent. So far as the Yorkshire district was concerned, the matter was discussed by members of the Commercial Section, and to reiterate the remarks referred to in the Southern Association letter would be most hurtful—at any rate, that was the opinion of the Yorkshire Section.

The PRESIDENT said that, as regarded the resolution of the Commercial Section of the Southern District Association, they found the resolution hampered them very much in their negotiations with the Coal Controller, who kept quoting it against them when they said something different. As regarded the interview with the Coal Controller, he never heard a case put before a Court by any counsel in the masterly way Mr. Bloor put it the previous Thursday.

Mr. MEUNIER asked why, in the interests of the country, was there to be any rationing at all? He had the highest confidence in Mr. Tagg and Mr. Bloor; but it was trying to get the best of a bargain in rationing. What he wanted to know was, Why ration at all?

The PRESIDENT said they could not go beyond what they had already done. The matter was now in the hands of the Coal Controller; and he (the President) could not say any more about the negotiations, which were confidential. As regarded Mr. Meunier's conundrum "Why ration at all?" he reminded him that rationing of foodstuffs had got rid of food queues.

Mr. R. E. GIBSON (Liverpool) said this was a matter in which he had been very deeply interested, and he had been thinking it would be wise to send a representation from this meeting to the National Gas Council, recommending that, so far as gas was concerned, the quantity of gas should be the same as in previous years, or some percentage of it, as the basis upon which the Coal Controller was evidently working was something that was going to upset them completely. He had applied it to a definite case; and it meant in that case a reduction of something like 40 p.ct. in gas output. This was a very serious thing. If they could send a representation to the National Gas Council, he thought it might strengthen their hands.

The PRESIDENT said he might say that this was practically the attitude that was being taken, as the scheme that the Coal Controller had put forward was unworkable. It put upon every householder to say how much gas he was going to take; and he did not know this. He could tell them that they had already put forward a recommendation on the lines suggested by Mr. Gibson; and he was hoping that their representatives had been able to make an impression upon the gentleman who had this particular matter in hand. He did think, however, that they made an impression on Mr. Calthrop the previous day; but he did not yet know what happened at yesterday's (Tuesday's) meeting.

VOTES OF THANKS.

The PRESIDENT proposed that the best thanks of the meeting be tendered to Mr. Tagg and Mr. Kendrick for the statements they had laid before them that day. They were very much indebted to them for what they had done.

Mr. MEUNIER seconded; and the vote was cordially agreed to.

Votes of thanks to the President brought a two-and-a-half hours' meeting to a close.

Toluol from Spruce Turpentine.

Writing in the "Journal of Industrial and Engineering Chemistry," Mr. A. S. Wheeler, of the University of North Carolina, says that the heavy demand for trinitrotoluol renders any possible new source of toluol worthy of careful investigation, in the hope of increasing the supply. It has been suggested that spruce turpentine (a waste product of the sulphite process of making spruce-wood paper pulp) might serve as an important source of toluol. Spruce turpentine is remarkable in that it consists largely of one aromatic hydrocarbon-cymol (cymene), and has in recent years been attracting interest in several quarters. MM. Boedtker and Halse, two French chemists, have carried out experiments; and Mr. Wheeler makes a preliminary report upon two experiments carried out in an attempt to confirm their findings. The results showed that spruce turpentine yields toluol when subjected to the combined action of benzol and aluminum chloride. The other product—cumol—is, he says, not a waste product, since it may be oxidized directly to benzoic acid. This will save a like amount of toluol now used to make benzoic acid. The amounts were less in both experiments than those claimed by MM. Boedtker and Halse; but Mr. Wheeler remarks that some necessary step on his part may still be lacking for maximum yields. The investigation is being actively pursued.

Colliery Power Stations Worked by Gas-Engines.

In the course of an article by Herr H. Wiegleb that recently appeared in the "Elektrotechnik und Maschinenbau," estimates and particulars are given concerning a 5000 KW. gas-electric station utilizing gas from one-hundred-and-twenty new coke-ovens at the Zollverein pit. The amount and quality of gas available—viz., 5700 cu. m. per hour, with a calorific value of 4000 calories—yields 6000 KW., using gas-engine sets consuming 3800 calories per KW.-hour; whereas only 3600 KW. could be obtained by using the gas to heat boilers serving steam-turbine plant. The lay-out of the station reduces constructional and operating expenses to a minimum. Pipes, cables, compressed air, and lubricating-oil tanks are in the basement; while the circulating pumps, ignition accumulators, transformers, and switch gear are in an annexe. Long pipe lines are eliminated. Tar and sulphur are removed from the gas by the Lux dry process; and the material used is regenerated periodically. Three double-acting, four-stroke, twin tandem engines are installed for the 3000 KW. sets, with a cylinder diameter of 1150 mm.; a stroke of 1300 mm.; and a maximum continuous output of 4500 H.P. at 94 R.P.M. The valves are arranged on an improved system, reducing the risk of breakages. The governor controls the gas and air supplies, and deals quite satisfactorily with sudden load variations of 60 to 70 p.ct. encountered during winding.

British Engineering Standards Association.—The Engineering Standards Committee, which was formed in 1901 by the leading Engineering Institutions, has now become incorporated under the Companies Acts, 1908-1917, the word "Limited" being omitted by licence of the Board of Trade. The Committee, therefore, becomes now a corporate body with a legal entity, and is thus enabled to maintain its position in regard to its brand, which has been largely used in a number of the British standard specifications. The wider use of the brand by manufacturers generally who are working to the British standards, should be of material advantage to the British engineering industry throughout the world. The good work that the Committee has done during the past seventeen years, which is such a monument to its founder, the late Sir John Wolfe Barry, K.C.B., F.R.S., and its acknowledged position in the engineering world, makes its incorporation a logical sequence in its development.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

HALF-YEARLY MEETING AT PORT TALBOT.

Last September, the Institution visited Briton Ferry, the home of their President, Mr. J. Mogford; and the May meeting this year was arranged to take place also in the immediate neighbourhood—at Port Talbot. Here the members assembled last Wednesday, to take part in an interesting programme, the main features of which were an inspection of a huge steel, iron, and coke-oven plant at present in course of erection, and consideration of the subject of the utility of the gas produced in such plants for town purposes.

The Business Meeting took place in the Council Chamber of the Margam Urban District Council—Mr. Mogford occupying the chair.

A Welcome.

Captain James Preston (the Chairman of the Council), at the outset of the proceedings, gave a short address of welcome; expressing the hope that the visit would prove profitable, as well as pleasurable. He said he did not know that the Margam Council, as a Council, had any claim to notoriety or fame; but they felt that they were in the midst of things, and looked forward to advantageous development in public utility services. In an ever-growing industry like the gas industry, such meetings as they were holding that day were very necessary. As a local authority, Margam had not long been the possessors of a gas-works; and though the development of the undertaking had been retarded through circumstances arising out of the war, they anticipated very rapid development with a return to normal times. He desired to pay tribute to the energy that their Gas Manager (Mr. Evan Rees) had displayed in all matters appertaining to the Gas Department.

The President, on behalf of the members, heartily thanked Captain Preston for his welcome. He said that, coming from a neighbouring district, he had a shrewd idea of the interesting day they had before them. They were very glad to have an opportunity of visiting a district which was so rich in things that were of interest to gas engineers. It was a new district, with a wonderful future before it. There was a virgin coalfield underneath, and excellent dock and railway facilities existed. The developments taking place at the present moment insured great prosperity for the town.

A Vote of Sympathy.

The President said that, before proceeding to the business of the meeting, he desired to express sincere regret at the loss of one of their members. He referred to the son of their Hon. Secretary—Mr. A. F. Thomas. He was a young man who was trained under one of their members. When taken, he was on the threshold of his life; and it was with the greatest sorrow they had to record his death. He asked the members to pass a vote of sincere condolence with his father and Mrs. Thomas.

Mr. J. H. Canning (Newport) seconded the vote, which was passed by the members rising silently.

Minutes of the Last Meeting.—Apologies.

The Hon. Secretary (Mr. Octavius Thomas, of Pentre) read the minutes of the previous meeting; and they were confirmed.

He also read a number of apologies for absence. There were letters from Lord Moulton (the President of the Institution of Gas Engineers), and other Presidents; from Mr. Thomas Canning, who had a business engagement in Newport; and from Mr. A. J. Bond, of Aberavon, who was absent through illness.

New Members.

Mr. Julian Stephenson, of Ferndale, and Mr. George Herris, of Brecon, were elected members, on the proposition of Mr. J. H. Jones (Dowlais), seconded by D. J. Davies (Hirwain).

Annual Report and Accounts.

The annual report of the Council stated that during the year one member and one student had joined the Institution, and two members had resigned—leaving the number at the end of the year at 69 members and three students. The accounts showed a balance in hand of £27 6s. 3d. in the hands of the Treasurer. A copy of the "Reports of District Associations" for 1917 had been sent to all members who had paid their subscriptions. In view, however, of the increased expenditure, the Council had decided that in future members who desired a copy of these reports must pay extra for it.

The report and accounts were adopted, on the proposition of Mr. Evan Rees (Margam), seconded by Mr. W. C. Jackson (Neath).

The Next President.

The President proposed that Mr. R. G. Clarry, of Swansea, be the President for the coming year. He said it was with great pleasure he did this, because he felt that the interests of the Institution would be in the hands of one of its ablest members. He (Mr. Mogford) had done his best as the manager of a small works in the past year; but there could be no doubt that an Institution such as theirs would be bound to derive great benefit from the position of the President being that of a man in charge of a large concern. It was all very well to bring the smaller men out, and induce them to give the best of their knowledge; but the manager of a large works always had experience that was useful to every member of the Institution.

Mr. J. E. Kenshole (Merthyr Tydfil), in seconding, declared that they would expect a lot from Mr. Clarry; and he was sure they would not be disappointed.

The proposition was carried with applause; and Mr. Clarry made brief acknowledgment of the honour that had been done him.

Other Officers.

Proposed by Mr. Kenshole, seconded by Mr. R. A. Browning (Neath), Mr. A. J. Bond, of Aberavon, and Mr. J. H. Canning were elected Vice-Presidents.

Mr. Canning, in returning thanks, said mention had been made of the advantages possessed by those who happened to be in charge of large works; but the services rendered to the Institution by the managers of the smaller gas undertakings should not be depreciated. Mr. Mogford himself had had a very successful year of office.

It was proposed by Mr. E. H. Swain (Pontypridd), seconded by Mr. J. A. Boucher (Maesteg), and agreed, that Messrs. H. Barker, E. Rees, and W. C. Jackson be members of the Council.

Mr. Henry Morley was re-appointed Hon. Treasurer, and Mr. Octavius Thomas Hon. Secretary; Messrs. G. S. Davies and D. J. Davies being chosen as Auditors.

Representative on the National Gas Council.

On the motion of the President, seconded by Mr. Kenshole, the Hon. Secretary was elected to represent the Institution on the National Gas Council during the ensuing year.

Benevolent Fund of the Institution of Gas Engineers.

The Hon. Secretary proposed that they should contribute the usual sum of two guineas to the Benevolent Fund of the Institution of Gas Engineers; and at the same time he appealed to any members who did not personally subscribe to do so.

Mr. H. D. Madden (Cardiff) seconded the motion, which was agreed to.

Amendment of Special Purposes Section Rules.

The Hon. Secretary explained that under the rules of the Special Purposes Section, it was necessary to give six months' notice of any amendment. It was found that they could not carry on with the present subscriptions; and members were already paying an increase. But to put things in order, he gave notice that at the next meeting he should move that the subscriptions be increased.

PROMOTING GAS SALES.

The next item on the *agenda* was the adjourned discussion on the paper on "Promoting Gas Sales," read by Mr. W. H. Cattell, of Swansea, at the last meeting—see "Journal" for Sept. 25 last, p. 560.

The President said he did not quite know what was the wish of the members. The paper was fairly fully discussed at the last meeting, and time was passing; but anyone who desired to carry the discussion further might do so. If no one had any more to say on the subject, he would ask Mr. Cattell to reply to the remarks already made.

Mr. Cattell said he quite agreed that the interest of the gas consumer and gas supplier was a mutual one. With reference to all-gas houses, they had several in Swansea, and, in addition, they had an all-gas hospital. Simplicity and standardization he agreed were of the utmost importance. They avoided duplication of patterns wherever possible, in cookers, fires, radiants, burners, and everything else they could standardize. As to the relationship between the show-room and fitting department, particularly in connection with the carcassing of houses, he might say that though practically no work was being done at the present moment in carcassing premises, it was essential that at least there should be the closest co-operation. Better still he thought was the arrangement at Swansea, where the show-rooms and fitting department were run as one. He was in entire agreement with what had been said by Mr. Hazell as to lady visitors. In fact, a lady was appointed for this work in Swansea in May, 1916; and she was still doing well. There was no doubt the fixing of cookers on free loan—particularly with prepayment installations—tended to the utilization of many gas-ovens as cupboards. At Swansea, they offered an inducement to the coin-meter consumers to burn a satisfactory quantity of gas by not charging the cooker rent when a pre-arranged consumption had been reached in the year. So that during the ensuing year the cooker-rent of 1s. or 1s. 6d. per quarter was not charged. All their coin-meter consumers who had cookers were circularized each January, acquainting them with the fact that their consumption of gas was such that the cooker-rent would not be charged. If a sufficient quantity of gas had not been used, they informed the customer that the consumption amounted to so and so, and that when such and such an amount was used the cooker would be free. In the matter of electrical competition for cooking and heating, they had always, at Swansea, adopted the attitude of pro-gas, not anti-electricity. Should the occasion demand it, they were quite ready to tackle an electrical offensive strenuously, and very definitely. With regard to prices fixed complete, he was unable to accept Mr. Kenshole's suggestion that an average price was unfair and unsatisfactory. The adapting of average or standard prices to almost every commodity was so universal that they hardly gave it a passing thought; and in selling many thousands of gas appliances in the past few years, he had found that a price fixed complete gave the greatest satisfaction to consumers. With reference to the sale of mantelpieces, &c., if there was a sharp ironmonger in the town, one was likely to get assistance, and not hindrance, if the matter was dealt with tactfully. In connection with the President's remarks as to the use of the Swansea show-room by visitors from other towns, he would be interested to know that they frequently got inquiries from all over the country. Every well-equipped show-room was an advertisement for good or evil, not only for its own town, but for gas in general. The subject of promoting gas sales was hardly of prime importance in September last, and was, he feared, of less interest now. In the interval greater attention had had to be paid to munitions works uses of gas. For this there was a tremendous field in South Wales which had

hardly been touched. A return to peace conditions would enable many of them to devote more attention to the consideration of sales development.

BYE-PRODUCT COKE-OVEN GAS.

Mr. EVAN REES (Margam) then read a paper on "Bye-Product Coke-Ovens as a Source of Gas Supply for Town's Use." Before doing so, he pointed out that his notes had been prepared nearly twelve months ago; and in the interval conditions had undergone some alteration.

The paper, with a report of the discussion by which it was followed, will be found on pp. 427-31.

VOTES OF THANKS.

Mr. T. H. HAZELL (Newport) proposed a vote of thanks to Mr. Cattell and Mr. Rees for their papers; and this was seconded by Mr. S. MURRAY (Aberkenfig), and heartily accorded.

On the proposition of Mr. CANNING, seconded by Mr. KENSHOLE, a vote of thanks was passed to the Chairman and members of the Margam Urban District Council for the use of the Council Chamber, and to Captain Preston for his opening remarks. Mr. Canning said the town was fortunate in having so able and enterprising a gas engineer as Mr. Rees, who had made a careful study of the conditions of the district, so far as gas affairs were concerned.

The CHAIRMAN, in returning thanks, said that the room would be open to members of the Institution on future occasions, while he remained at the head of the Council.

PLACE OF NEXT MEETING.

It was agreed that the place of next meeting should, as usual, be left with the Council to decide.

Mr. CLARRY said he quite hoped to have the pleasure of welcoming the members to Swansea.

The members then adjourned for luncheon at Ellis's Café, and thereafter proceeded to the completion of the programme.

COKE-OVEN PLANT AND GAS-WORKS.

The afternoon's visits were of particular interest, in view of the paper which had been read at the morning meeting. Indeed, from what was seen, it was easy to understand how the subject introduced by Mr. Rees had been forced upon his attention, and the nature of the argument which Port Talbot presents to him for considering carefully the utilization of coke-oven gas for town purposes, in connection with the problem of coal conservation.

First the members proceeded to the new iron and steel plant now in course of construction for Messrs. Baldwins, Ltd., which, when completed, must add vastly to the industrial prosperity of Port Talbot. It is a huge scheme; and the work is at a stage that permits full appreciation of the task undertaken. The works are really an extension of Messrs. Baldwins' existing large steel plant—the Port Talbot Steel Company; but new departures are the blast-furnaces and coke-ovens. Both plants are adjacent to Port Talbot Docks, and are provided with excellent facilities for handling either raw or finished material by rail or seaboard.

When finished, the new plant will be one of the best-equipped for the manufacture of iron and steel in South Wales. No time, labour, or expense is being spared on the works, the foundations alone of which have cost many thousands of pounds.

The scheme consists of a battery of 120 Coppee regenerative coke-ovens, with recovery plant to deal with tar, ammonia, crude benzol, and rectified benzol; the recovery section of the plant being housed in substantial brick buildings of pier and panel design. The plant is designed to carbonize about 6000 tons of washed coal per week, when in full operation. Part of the surplus gas will be utilized for the heating of the ovens, and the remainder for the heating of the steel furnaces, and as boiler fuel. A gasholder of 1,000,000 c.ft. capacity in steel tank is being erected by Messrs. Cockeys, Ltd., for the Coppee Company; the same firm having also undertaken other portions of the plant. The holder will be used for storing and mixing purposes.

Two modern-type blast-furnaces are being erected, with the customary equipment; and extension of this section is provided for. The blast-furnace gas will pass through a purifying and cleaning process, bye-products being extracted; and the waste gas will be conveyed to a battery of water-tube boilers fitted up for the utilization of gaseous fuel. The steel section consists at present of four modern-type 50-ton open hearth furnaces, housed in a lofty steel building, with ample room for considerable extension. In addition, there will be a mill for the rolling of heavy and light sections for structural work.

Another feature of the work is the erection of a large electricity generating station, which will furnish all the necessary current for the operation of the whole plant, as well as provide power to Messrs. Baldwins' new sinkings at Margam, and their other collieries near Pyle.

A considerable part of the work—such as the iron-ore bunkers, coal-bunkers, and a water-tower—is being constructed in ferro-concrete; but in spite of this fact, it is calculated that already some 14 million bricks have been used on the site. The character of the subsoil called for the bestowal of very great care, and the spending of many thousands of pounds, on the foundation work. The whole of the excavations, piling, and concrete foundations have been carried out by Messrs. Topham, Jones, & Railton, Ltd., under the direction of Mr. F. S. Habell; and in this work they have utilized the labour of a large number of German prisoners of war.

The members were piloted over the several portions of the plant by Mr. P. N. Hambly, of the Coppee Company, and Mr. J. D. Coutts, the Resident Engineer, as far as the coke-ovens and recovery plant were concerned; and by Mr. S. R. Cound and Mr. Matthew Thomas, Messrs. Baldwins' representatives on the site, for the iron and steel sections. Mr. Crawford, representing the Ministry of Munitions, accompanied the party.

The gas-works, which were subsequently inspected, are separated only by a railway embankment from Messrs. Baldwin's works. They are compact, and, of course, new. As a matter of fact, Mr. Evan Rees went to Port Talbot from Blaina to build the works in 1914, prior to which time the district was supplied by the Aberavon Corporation. The erection of the works (which were designed by Mr. Frank H. Jones, Consulting Engineer to the Margam Urban District Council) was begun in May, 1914, and completed in every particular, and gas sent out, the following December. The particular circumstances of the undertaking have assisted to fasten the attention of Mr. Rees on coke-oven gas. In the arbitration to determine the amount to be paid, on severance, by the Margam Council, the Aberavon Corporation were awarded £30,000. For this Margam acquired a distributing system; and the new works, with a producing capacity of 50 million c.ft. per annum, represented another £20,000. The first year's output (for the twelve months ended March, 1916) was 43½ million c.ft.; and at that time the capital was over £50,000. The output for the past year remained at practically the same figure; but, owing to the restrictions, there is at present no public lighting. Were this resumed at the old rate, it would represent another 5½ million c.ft. of consumption, and the works would, after three years' operation, have attained their maximum producing capacity. This would mean, if coke-oven gas were ruled-out, the expenditure of further capital upon extensions. There is one feature about the policy adopted—induced by capital considerations—which is of interest. No slot-meter installations have been fitted-up. The Council provide the usual service and meter; but the gas consumers have had to find all internal fitments. This progress has been made at very low cost; this policy having been favoured by Mr. Rees because of the capitalization of the undertaking at the outset.

As to the works themselves, Messrs. Gibbons Bros., Ltd., were responsible for the whole of the buildings, retort-bench, and iron-work, and Messrs. Cockeys, Ltd., for the gasholder, the scrubbing plant, and purifiers. The retort-house and coal-store is a substantial brick building with steel roof, and is equipped with five settings of eight retorts each, with regenerative furnaces of the Gibbons & Masters patent type. The exhausting plant consists of duplicate sets of Waller three-blade rotary exhausters, direct coupled to steam-engines, and controlled by Waller's patent steam governors. The Livesey washer is of ample capacity, built by Messrs. Willey & Co., Ltd., and is now used in connection with the "C" process. The tower-scrubber stands 30 ft. high by 8 ft. diameter, and deals effectively with the elimination of ammonia. The purifiers are four in number, each 12 ft. square by 5 ft. deep, fitted with three layers of grids. Oxide is used; and the purifiers are worked on the "backward rotation" system. The station-meter, by Messrs. Parkinson & W. & B. Cowan, Ltd., is of rectangular design, and of 20,000 c.ft. per hour capacity. The gasholder has three lifts, and is of a capacity of 256,000 c.ft. From the gasholder outlet, the supply is controlled by two Parkinson & Cowan weight-loaded governors of 12 in. and 10 in. diameter respectively. The valves and connections to the governor are so arranged that the gas can be distributed by two separate streams, or if necessary the 12-in. and 10-in. trunk mains can be both supplied by either.

The works are well designed; and the best advantage has been taken of the ground available. A railway siding connects them with the Great Western and Port Talbot Railway main lines.

The day's proceedings were brought to a close by a return to the Council Chamber, where tea and light refreshments were provided by Mr. Evan Rees.

BYE-PRODUCT COKE-OVENS AS A SOURCE OF GAS SUPPLY FOR TOWN'S USE.

By EVAN REES, Margam.

[A Paper read before the Wales and Monmouthshire District Institution of Gas Engineers, May 29.]

In the last decade, we have seen considerable additions to the number of coke-oven and recovery plants in this country, having for their primary object the manufacture of good-grade metallurgical coke and the recovery of bye-products. In the majority of cases the surplus gas is partly utilized for heating the ovens, and partly for the generation of steam under boilers, or of electricity by means of internal combustion engines, or, further, for the heating of furnaces, if the coke-ovens form part of the lay-out of a complete steel plant. I have no intention of attempting any description of the several types of ovens utilized—members are doubtless quite conversant with the general constructional details from the detailed descriptions which have appeared from time to time in the technical journals.

During the past few years, also, several gas authorities have taken up the utilization of surplus coke-oven gas either entirely or as an adjunct to their existing coal-gas plants; and the experience of one authority in particular where coke-oven gas is used entirely

has proved eminently satisfactory. There are in this Institution several members who have utilized coke-oven gas for town purposes, with no small measure of success; so that the subject is by no means novel or new. I have to confess to some attraction for coke-oven gas, by reason of the erection of a battery of 120 modern regenerative ovens and complete recovery plant, forming part of a plant for the manufacture of iron and steel, on a site situate about 150 yards from the works which I control.

My Council have afforded me several excellent opportunities of inspecting plants in several parts of the country, with a view to ascertaining and collecting evidence as to the advisability of adopting coke-oven gas as an adjunct to their existing coal-gas plant, or to supersede such plant, if found satisfactory and necessary, subject to the steel interest having any surplus gas for disposal. The governing factors in our case are:

(*a*) Certain rapid development of the town and district.
(*b*) Existing coal-gas plant limited to a maximum production of 250,000 c.ft. per diem.
(*c*) Heavy initial capital expenditure.
(*d*) Margin between present output and maximum producing capacity of present plant under 5,000,000 c.ft.

I am conscious of the fact that to many minds the suggestion of the utilization of coke-oven gas for town purposes savours of the unorthodox; but while the following of orthodox lines may be the more pleasant, and the line of least resistance, the unorthodox has many features to commend it, and is worthy of at least consideration and trial.

Controversy will always range round the subject of the different systems now in use for the carbonization of coal; and in view of the trend of modern practice of heavy charges and longer periods of carbonization, it is certainly reasonable to suggest that the heavily charged horizontal retort has a remarkable likeness to the practice of the chamber-setting or coke-oven. Bearing in mind the splendid results obtained by the several systems in vogue at the present time, finality in selection and method is still a long way ahead. While the coke-oven plant is designed primarily for the production of metallurgical coke from a class of small coal, and as high a proportion of bye-products as possible, the surplus gas is generally a matter of no particular interest to the coke-oven engineer. The opposite is the case in regard to coal-gas plants; while the method of arriving at the primary objective is certainly and similarly characteristic.

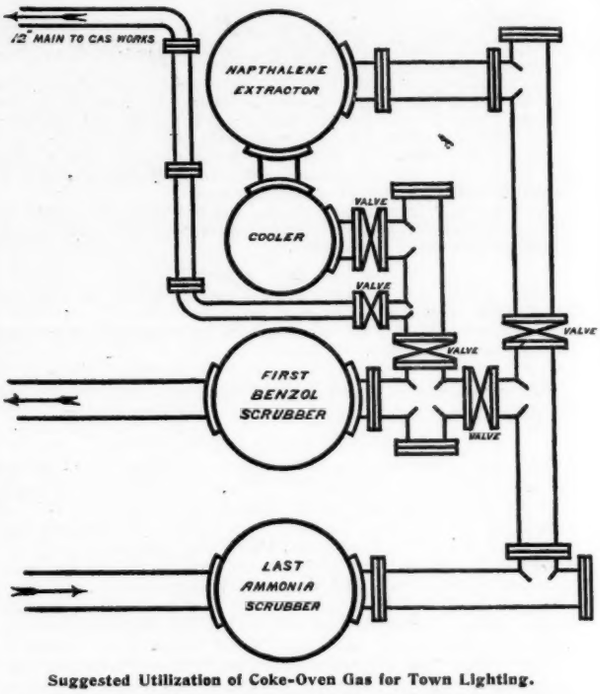
Stripped or Unstripped Coke-Oven Gas.

It is likely that the grade of coal used in coke-ovens may lend itself to some criticism in connection with the resultant gas obtained in comparison with the grades ordinarily used on the majority of coal gas plants. But it goes without saying that, with an inferior grade of fuel, a correspondingly inferior yield of bye-products will be obtained, and it is hardly likely that the very much-alive coke-oven interests would prejudice their results by so obvious a scientific and commercial error. But the surplus gas is the point at issue; and the main feature for consideration is: To what extent (if any) can coke-oven gas be utilized for town purposes, having due regard to the high efficiency demanded of gas suppliers generally by the public? Secondly, there is the question of the comparative value of coke-oven gas and normal coal gas.

It does not necessarily follow that a supply of coke-oven gas can be taken with mutual advantage wherever surplus coke-oven gas happens to be available in the neighbourhood of a populous or rapidly developing district. It is a question having many factors. Some coke-ovens yield little surplus gas—this depending on the type of oven in use. On the other hand, some coke-oven interests have their own uses for all the gas they make—in gas-engines for the generation of electricity, or, in the case of iron and steel works, for the heating of furnaces, &c. Another factor is the cost of production of town gas in the ordinary way, which varies widely according to local conditions and circumstances, and may be so low that no material advantage would be derived from a coke-oven supply. Further factors to be considered in the matter are volume required per diem, purifier capacity at works, storage capacity and effective stand-by plant, price per 1000 c.ft., and reasonable guarantees of continuity of supply. There still remains the question of comparative values. The composition of the gas is the important factor. The bogey of the amount and character of the incombustible content has to be taken into consideration, and, further, whether the gas should be "stripped" or not of its benzol content.

Where the practice of fitting the battery of coke-ovens with duplex mains is carried out, as at Middlesbrough, the result is the production of a gas satisfactory in every respect, with consequent excellent results to the gas supplier and consumer; the gas approximating 16 candles in illuminating power and 560 B.Th.U. The gas provided for town use where the coke-ovens are fitted with duplex mains and duplicate recovery plant is a normal coal gas, delivered to the lighting authority free of tar, ammonia, and naphthalene. These conditions are, of course, ideal, and would be welcomed wherever they might be available.

With regard to the point as to whether or not coke-oven gas, when proposed to be used for town purposes, should be stripped of its benzol content, I am of opinion that it should be unstripped, so as to counteract the high proportion of nitrogen. Coke-oven engineers may not agree with this, and retort that stripped gas is good enough, and would give satisfactory service for domestic purposes—quoting in support its successful application and utilization in numerous towns on the Continent. But my observations, and the experience of those handling stripped gas in this country, are to the contrary; and, furthermore, the efficiency is low, which would retard rather than advance the progress of the further general utilization of gaseous fuel as a means of light and heat for domestic purposes. The initial low illuminating power and colorific value are a sufficient deterrent, without considering other difficulties that would arise from its use. It is fairly certain that stripped coke-oven gas would mean compulsory enrichment, either with benzol or carburetted water gas, at the governor outlet.



Suggested Utilization of Coke-Oven Gas for Town Lighting.

Sketch Showing the Necessary Connections for this Purpose at the Bye-Products Plant.

The ideal conditions obtainable where the ovens are fitted with duplex mains and duplicate recovery plant are the exception rather than the rule in this country, and I believe for the reason that the general opinion held among coke-oven engineers is that the expense involved to provide duplicate mains and recovery plant for the general utilization of coke-oven gas for town purposes is not warranted by the amount received for the unstripped gas so utilized. This, however, is a matter for argument and arrangement between the parties concerned, and does not affect in any way the possibilities of coke-oven gas.

But as the single main fitment is the general rule in present-day coke-oven practice, the issue is narrowed down to the factor, Is it a practical proposition to utilize coke-oven gas for town purposes taken off a single main? What are the essentials? In the first place, the gas must compare reasonably with a normal coal gas; and this stipulation necessarily means using unstripped gas. Secondly, the gas must be free of tar, ammonia, and naphthalene, and must approach approximately in illuminating power the standard of the Act of Parliament of the company or authority, with a calorific value of not less than 500 B.Th.U. So far, the proposition holds good; but the question arises, which makes the suggestion savour of the unorthodox in gas-works practice, What is the average quality and composition of the coke-oven gas at the point where it is proposed to take it off? Herein lies the one and only real difficulty.

Analyses of Coke-Oven Gas.

In order to arrive at a solution, and to ascertain if the proposal could be substantiated in practice, it became necessary to obtain analyses of the average coke-oven gas given off during a coking period of 24 to 28 hours, and compare with the known analysis and composition of a straight coal gas as manufactured at any gas-works. At the outset there were well-known factors in the composition of the coke-oven gas that tended against the comparison of this gas with a normal coal gas; but bearing in mind that the gas of the future will be toward a non-illuminating flame, and its essential feature and value that of a heat unit for all purposes, the matter appeared to me to be worthy of some further investigation.

I append a published analysis of a normal coal gas (A), of a mixed gas (coal gas and carburetted water gas) sent out by a company in the Principality (B), of unstripped coke-oven gas taken off a single main on a plant near Chesterfield (C), and of an average sample of unstripped coke-oven gas taken off a single main on a plant in this county (D). The comparison and inference I leave in your hands for judgment, after comparing the

figures with the known analysis of the gas sent out by each member at his own works.

	A	B	C	D
Hydrogen	49·0	45·0	47·7	49·0
Saturated hydrocarbons	27·0	36·0	26·2	31·7
Unsaturated hydrocarbons	4·0	4·0	3·0	2·3
Carbon monoxide	9 0	10·0	9·0	5·7
Carbon dioxide	3·5	2·0	1·1	2 6
Nitrogen	7·5	3·0	13·0	8·3
Oxygen	*Nil*	*Nil*	*Nil*	0·4
Calorific value, B.Th.U.	550	580	520	548

It will be observed that the analysis of the coke-oven gas compares favourably with the coal gas except in two items—*i.e.*, the unsaturated hydrocarbons and nitrogen. Should any deficiency in the illuminating power of the gas occur, this could be remedied and improved by reverting to a dual system of purification—that of partly oxide of iron and partly lime. This procedure would eliminate to a considerable extent the carbon dioxide content, and would result in an improvement in illuminating value of approximately a candle, at a cost of about 0·75d. per 1000 c.ft.

The nitrogen content is, however, the problem to solve; and, this solved, the difficulty in the way of utilizing coke-oven gas from a single main is overcome. A proportion of nitrogen equal to 13 p.ct. (Analysis C) in the coke-oven gas compares unfavourably with the average of 3 to 7 p.ct. in normal coal gas; and it naturally affects its value and efficiency. To what extent (if any) does this high percentage of nitrogen affect the efficiency of the gas when considered from the practice of the present day on coal-gas plants of high yields per ton of coal carbonized, &c.? While this point is likely to give rise to considerable argument, I venture to say, from a series of observations and experiments, that the high nitrogen content of coke-oven gas does not affect the efficiency of the gas as much as one would anticipate, when used for domestic purposes in particular, provided the gas is delivered at a pressure slightly higher than our normal.

Considerations for Town Use.

The additional pressure required beyond the present maximum pressure for peak load would vary according to local conditions and circumstances; and from the observations made and results noted, it can, in my opinion, be said with some degree of certainty and confidence that unstripped coke-oven gas can provide the service for lighting, heating, and cooking purposes, where conditions and circumstances are favourable to its adoption. It is therefore reasonable to inquire wherein lies any advantage of utilizing coke-oven gas for town purposes. There are two aspects and interests to be considered—local and national. In respect to the first, it cannot be gainsaid that a supply of gas in bulk would in many cases be an undeniable boon to small and medium-sized works (which, after all, form the bulk of the undertakings generally), and would result in:

(*a*) The closing-down of the manufacturing plant.
(*b*) Freedom from the vagaries and anxieties of the coal and other markets.
(*c*) Lower price to consumers, with equal average efficiency, and such low price conducive to further development in the use of gaseous fuel generally.

In respect to the national interest aspect of the proposition, the warnings now given by eminent scientific men regarding the conservation of coal supplies cannot be disregarded; and it must be admitted that only when coal is submitted to distillation for its gas and recovery of its valuable bye-products is it utilized to its best advantage. The present method of steam-raising by the use of coal direct, in almost every large works and electrical generating station throughout the country, is without doubt wasteful and inefficient, in spite of all the mechanical contrivances and equipment for automatic and economical handling. The utilization of coal in open grates is no better—in fact, worse; and, further, it cannot be said that the numerous small and medium-sized gas undertakings can utilize the coal necessary for their primary purpose to the utmost advantage, by reason of the fact of their particular and peculiar circumstances and the comparatively small quantities handled. The scale of operations of a small or medium sized gas undertaking is infinitesimal compared to that on large modern coke-oven plant. The output of surplus gas alone from a battery of 120 coke-ovens would be sufficient to supply a town, or several towns, up to 4,000,000 c.ft. per diem. But the foregoing does not necessarily mean that I am in any way depreciating the excellent work and results obtained from small and medium-sized works.

Then there is the highly important question of bye-products. The bye-product recovery plant looms larger than ever on the horizon of the industrial and scientific world. Though in the present international crisis the gas industry has played a part second to none in the recovery of essential products for high explosives, the larger field of commercial and industrial activity in the extraction and preparation of coal tar dyes, &c., is ample evidence of the importance of the distillation of coal and the recovery of bye-products. The powers that be are alive to this; and further development of coking plants must be expected, with a resultant increasing volume of gas for disposal. Such further development in this respect, together with a possibility of the linking-up of small undertakings to a large central station, will be conducive to the prohibition to a certain extent of the present wasteful methods of utilizing one of the most important items of national wealth. The question of coal conservation is of paramount importance; and, apart from other factors previously mentioned, it can be said with some degree of confidence that in the hands of the gas industry lie the best means of conserving the use of coal for domestic purposes in particular, and for providing the fuel and the necessary equipment for the much desired permanent abatement of the smoke nuisance.

There is, I am sure, much speculation in the minds of all concerned in the gas industry as to the channel wherein will lie the greater future activity of the industry; and I believe that if the wave of progress in gas utilization during the past twenty years is to be maintained and improved in the coming twenty years, the avenue lies in the larger adoption of gaseous fuel for all domestic work. The public are ready and willing to adopt more efficient hygienic and labour-saving methods in the matter of domestic routine; and to bring this to successful and universal adoption is up to our industry, through the supply of a gas suitable for the needs of the public at a price that will brook no competitor.

Old standards are passing away; and the substitution of a more scientific standard is the new order of things. The ultimate substitution of a heat unit standard instead of the illuminating power standard is beyond doubt; and the Act of 1916, which stipulates a calorific value of 500 B.Th.U. as being sufficient to provide all the efficiency likely to be demanded by the users of gas for all purposes, is a positive step in the direction indicated. I therefore submit that the gas authorities should, and probably will, work in conjunction with the coke-oven interests for the supply and distribution of a gas suitable in every respect to the ever-growing needs of the public.

Conclusion.

In conclusion, I have to reiterate that the suggestion offered in this paper is in the main unorthodox, and not quite in accordance with the recommendations of coke-oven construction firms where coke-oven gas is proposed to be utilized for town purposes in this country. But the evidence collected clearly shows that the possibilities of a supply of coke-oven gas taken off a single main are sufficiently important to warrant investigation and trial. The towns that have adopted coke-oven gas entirely, or as an adjunct to their coal gas, appear to be satisfied with the results; and bearing in mind the extent of its utilization on the Continent and in America, where several towns and cities are linked-up from a central station, it is reasonable to suggest that its further utilization in this country should not be long delayed, so that the unorthodox suggestion of to-day (of bye-product coke-ovens as a source of gas supply for town use) will in all probability become the orthodox practice of a few years hence.

DISCUSSION.

Mr. J. H. Canning (Newport) said the paper had opened up a subject which, though not quite new, was one of considerable novelty, and one of great interest to the gas industry at the present time—especially in their district. Before making any remarks on the paper, he would like to draw attention to what Mr. Rees himself had said: "It does not necessarily follow that a supply of coke-oven gas can be taken with mutual advantage wherever surplus coke-oven gas happens to be available in the neighbourhood of a populous or rapidly developing district." He (the speaker) mentioned this because he wished it to be understood that any remarks he might offer had no application to special districts or special circumstances. These circumstances would have to be taken into account by those responsible for the undertakings in the particular districts. He would only speak in a general sense. In the first place, the objects aimed at by coke-oven plants and by gas-works were very different, though sometimes they were spoken of as apparatus intended to accomplish similar things. The object of the coke-oven people was, as Mr. Rees said, to produce an excellent metallurgical coke. Mr. Rees stated that they got a guarantee of the quality of the gas supplied to them from the coke-ovens by reason of the fact that it was not to the interest of the proprietors of coke-ovens to use an inferior coal, because it would affect the yield of bye-products. He (Mr. Canning) could hardly agree with this contention; because, after all, the bye-products were a very small matter to coke-oven people, whose real object was to produce a coke possessing certain physical characteristics—more particularly of strength and firmness, with a low content of sulphur, phosphorus, and ash. This was the one point to which they must really direct their entire attention. The question of bye-products he did not think would influence them very much. If they could get a suitable coal which would give them a higher yield of bye-products, no doubt they would take it; but he did not believe they could count on the coke-oven people relying mainly on the yield of bye-products, and thereby guaranteeing a certain quality of gas. Then there was another matter. Mr. Rees told them very frankly that he wrote this paper some twelve months ago. Now, as they were all aware, during the past twelve months things had developed very rapidly. Since the start of the present war, matters had developed as much in twelve months as they often did in ten or fifteen years in pre-war times; and the question of the production of fuel oil for the navy had practically revolutionized all their ideas with respect to coal carbonization. As the result of experiment, low-temperature carbonization had been practically abandoned; and as far as one could see, it was not likely to occupy a very prominent place in the future. Again, coke-ovens were not in a position to supply much in the way of fuel oil. For very many years to come, improved methods of carbonization in gas-works would supply, and would have to supply, the needs of this country in regard to fuel oil. The matter was beyond the realm of experiment now. Improved methods of carbonization in gas-works had succeeded, not only in producing very large volumes of gas—larger even than those obtained under previous conditions—but at the same time in greatly increasing the yield of fuel oil. Without depreciating in any way the work done by the great coke-oven industry, he would claim for the gas industry that they preceded the coke-

oven industry by the best part of a century, and were still ahead of it in matters of carbonization. He thought the near future would show that they could produce a large quantity of gas, together with a very varied number of bye-products, better than could be done in any other way. Both in the national interest and as a matter of the production of cheap gas, they would be in a position, not only to compete with, but to do much better than could be done by, coke-oven gas. As Mr. Rees said, controversy would range round this subject very considerably. They must always take into account all the local conditions; but, speaking generally, there were some matters that must be kept in mind. The volume of gas produced daily by a coke-oven was practically a constant quantity; and it seemed to him that it would be far better in the interests of the coke-ovens themselves that they should find a use for it in driving their own machinery, heating furnaces, and raising steam in their boilers. The demand of gas undertakings was a varying one; and consequently, as the supply of gas from a coke-oven was constant, it would be better that they should have some method of disposing of it by way of a regular consumption. Next came the question of effective stand-by plant; and this was really the *crux* of the whole matter. They must remember that the coke-oven industry (which was totally unfettered by any vexatious restrictions) was able to do a great many things which the gas industry had never been able to do; and the reason for this was that a gas-works was a public service. They must always bear in mind that they were under statutory obligation to maintain a constant supply. If they took their gas from the coke-oven people, they could never rely upon the supply being constant. There might be strikes at the collieries or at the coke-ovens. There were the fluctuating demands for steel and iron, which might result in the shutting-down of the coke-ovens for considerable periods. Therefore it would be absolutely necessary that they should keep a stand-by plant in the gas-works ready to take up, not merely the average load, but the full winter load if need be, and to take it up at very short notice. They would be obliged to keep this plant in repair, with all the tools and adjuncts for working it. But, most difficult thing of all in these times, they would have to keep stand-by labour. It was impossible to bring a number of unskilled labourers into a gas-works, and set them to work making gas at a moment's notice. The necessary body of skilled men must be kept at hand; and naturally this could not be done without expense. It would always be a charge upon the cost of gas to the consumers. He was not saying that it might not be advisable in some cases to take coke-oven gas; but what he did say was that, taking into account these factors, the price paid to the coke-oven people should be such as to compensate the gas undertaking for all these points, which were not imaginary ones. They were real points of practical importance which it was absolutely necessary to consider. As to reasonable guarantee of continuity of supply, he did not think that any coke-oven people would give them this. Apart from labour questions and other difficulties, there was, as he had already said, the iron and steel market. They might be compelled to shut-down at any time if there was over-production. This was not likely to occur for some time after the war; but it would eventually have to be reckoned with. Next came the question of quality. Mr. Rees said that at Middlesbrough the gas was supplied from the coke-ovens through duplex mains; and he took it this meant that the best gas, from the early portion of the charge, was delivered to the Middlesbrough Corporation.

Mr. REES: That is so.

Mr. CANNING: If, under the best conditions, with duplex mains and Northern coal, the gas as supplied to Middlesbrough is 560 B.Th.U., can we expect that the gas from our local South Wales coal will reach the figure given of 548 B.Th.U.?

Mr. REES: That is total heat.

Mr. CANNING: Is it gross in the case of Middlesbrough?

Mr. REES: No, it is not.

Mr. CANNING said that explained the difference; but still, apart from this, he should very much doubt if, over a coking period of 24 to 28 hours, using Welsh coal, it was possible to obtain a gas of an average value of 548 B.Th.U. Did the sample in question represent the average of the whole charge, or was it taken at any particular period? So far as the nitrogen values were concerned, except in the case of "C" (the Chesterfield plant) they did not appear to be excessive. In fact, speaking generally again, he would be surprised if coke-oven managers could work down to these conditions, taking all the circumstances into account, over the whole of the charge. He agreed absolutely with Mr. Rees' advocacy of the economy of gas for all purposes, and also with the point he made that they must be able to supply cheap gas which stood outside all competition. The question was really, Would the coke-oven people, in view of all the difficulties—the quality of the gas, stand-by plant, &c.—that would have to be contended against, be able to compete with the modern system of carbonization which was likely to be available for gas undertakings in the near future? A very great point in connection with the whole matter was that in any case it would be necessary for the gas undertaking to put down this stand-by plant equal to full requirements; and he claimed that, under these conditions, it was better for them to put down the most modern, labour-saving, and efficient plant right away, and make the gas themselves, retain the valuable bye-products, and maintain their control over the quality of the gas—not allowing these important matters to come into the hands of outside people. There was food for much thought in the paper, which dealt with a matter of very great interest to the members of the Institution.

Mr. H. D. MADDEN (Cardiff) said it was important to remember, as the author had stated, that the paper was practically written twelve months ago; and much alteration had taken place since then. If a year ago he (the speaker) was of opinion that the gas-works was the proper place to bring a ton of bituminous coal to for carbonization, he was still more of this opinion now. Everything seemed to be sacrificed by the coke-oven industry to the output of coke per oven per day. This resulted in the speeding-up of the heats, which meant in their particular case degradation of the volatile hydrocarbons and bye-products generally. They laid themselves out to get coke, from first to last. Gas was a bye-product. The gas-works was the most desirable place in which to deal with coal; and he thought that those who had followed the Technical Press during the past year could have no doubt that the gas industry stood on a much stronger footing to-day for the carbonization of coal and the working-up of bye-products than was the case a year ago. Mr. Canning had spoken of fuel oil. This was one question; and he thought there were many other questions relating to carbonization lying dormant—or, perhaps, not really lying dormant. There was the work that Mr. John West had done in the handling of coal in vertical retorts, increasing the bye-products and yield per ton. This was one of the greatest works done in the carbonizing of coal; and there were other things coming on which would no doubt carry it still further. Then there was another factor. Supposing for one minute that a town was deprived altogether of its gas-works, there would still be the problem of domestic coke, because no coke-oven plant could give a supply of this. But these were points by the way. He thought the pith of Mr. Rees' paper was in the last clauses, where he summed the matter up. The whole trend at the present time was conservation of coal; and he believed the Government would in the near future "sit upon" any class of people who wasted bye-products. Therefore it came back to the question of carbonization in the proper sense of the word. He quite agreed that in individual cases a supply of coke-oven gas might possibly be advisable; but in the best interests of the nation and of the conservation of coal, he still adhered to the general principle that a gas-works was the best place for carbonization.

Mr. R. G. CLARRY (Swansea) remarked that some of the members of the Institution were already using coke-oven gas; and a few words from them would be appreciated. Any observations he himself might make would be of a general character; one could not lay down a definite law to cover the whole subject. With regard to the conservation of coal supplies, he believed that within a few years it would be made practically a penal offence to consume coal in an open grate. The electrical industry had had a great boosting-up in the report of the Coal Conservation Committee. It was a pity it was not accompanied by certain provisos as to the recovery of bye-products. He had been looking at the analyses of gas; and adding up the incombustible constituents, he found that the coal gas contained 11 p.ct., and the two unstripped coke-oven gases 14·1 and 10·9 p.ct. He must agree with Mr. Canning that the coke-oven analysis was rather low. Mr. Rees mentioned the word "bogey" in connection with the incombustible content of the coal. He (the speaker) did not know how it was meant; but he regarded the incombustible content of a gas as a very important matter, and a very real difficulty, where it exceeded a reasonable quantity. The tendency of modern times was to get heating efficiency in the gas; and it was found that the flame temperature was one of the greatest factors in getting heat.

Mr. W. C. JACKSON (Neath) said there were one or two things that would require to be done at their works, if they were to supply coke-oven gas. There was the question of pressure. It was well known to all of them that, as the quality of the gas decreased, it was essential that they should increase the pressure, if they were to give anything like satisfaction to their consumers. So it would mean in many cases that recourse would have to be had to boosting machines, as the weight of the holder would be insufficient to furnish an adequate pressure to the district. Then as to the amount of incombustibles, he felt with Mr. Clarry that this was a very real "bogey," in the sense that they ought to keep clear of it as much as possible. In his own case, twelve months ago last winter he could not get sufficient labour; and during part of the time they had to send out gas which had been stretched. He had never had a more worrying period in all his experience. During the past winter, they had been mixing anything up to 20 p.ct. of blue gas with the straight coal gas; and the complaints had been practically the smallest he had ever known. This showed that the "bogey" of inert constituents was really a pretty big one. If they could make a good straight gas, and mix it with (say) blue gas, so that it was fairly free from inerts, they could satisfy their consumers much better, even on a lower calorific basis. It would certainly be interesting to hear the experience of those who had tried coke-oven gas.

The PRESIDENT (Mr. J. Mogford, of Briton Ferry) remarked that the users of coke-oven gas had received several invitations; and he trusted they would respond.

Mr. T. E. FRANKLIN (Barry) said he could not see any suggestion at all in the paper to the effect that gas-works should be shut-down or abandon their methods. He took it that what Mr. Rees meant was that, in the interests of the nation, and of certain localities where gas had to be produced as a bye-product from coke-oven plants, it was the duty (and the only sensible course to adopt) of the people in the district to see if they could wisely and profitably make use of this bye-product. If he himself had the opportunity of taking such a supply at a figure that would pay, he should think it his duty to advise his Committee to made what use they could of it. A great deal had been said about quality. The restrictions on calorific value and illuminating power of gas in this country, had been the means of unreasonably keeping the price up in many places. He thought that the gas which could be produced at the lowest possible figure, having regard to the local circumstances in every way, was the most economical and best gas to supply to the consumers. He took it the trend of the paper was to advise them, if there was such a bye-product gas, to see what could be made of it; and he had not the slightest doubt that it could be made useful for town supply.

Mr. OCTAVIUS THOMAS (Pentre) remarked that, as one who had been offered coke-oven gas, he would like to state that he put all the facts before his Committee, and they came to the conclusion that it would not pay them to take the gas. He could not say more than this at the moment. With reference to Middlesbrough, the obligation on the colliery company, so far as he understood it, was to supply 12-candle gas. If anything should happen to the coke-ovens, the Middlesbrough Corporation had sufficient water-gas plant on hand to enable them to supply the whole of the gas required in the town straight away. Should the colliery company not supply gas of 12-candle power, he believed the Corporation had the right to bring it up to this quality and charge the colliery company with the cost. Now as to coke-ovens in their own district. A very large proportion of the coal that was coked in coke-ovens was steam coal; and the quality of gas in steam coal was very different from the quality of gas from the coal used in Middlesbrough. The coke-oven manager would not care twopence what was the quality of his gas, so long as he made good

coke. He had noted two analyses of coke-oven gas in this district. He had not the calorific value; but the unsaturated hydrocarbons in one case were only 0·72 p.ct., as against 3 p.ct. in the case of Chesterfield, and 2·3 p.ct. for the plant marked D. In the other case, the figure was only 1·9 p.ct. The nitrogen was 14·4 and 11·8 p.ct. This was very different from the quality given by Mr. Rees, though he did not at all wish to say that his figures were inaccurate. He was fortunate in the time at which he tested the gas. Of course, Middlesbrough having duplex mains the gas that was made during the first hour or two was not touched. Then, again, the gas was shut off after twelve hours, so that they got the pick of it.

The PRESIDENT remarked that Mr. Rees was to be congratulated upon the discussion which his paper had evoked. As one or two of the speakers had suggested, in these matters they were all to a great extent the creatures of environment. He came from a neighbouring district very similar to Port Talbot in its industries; and for the last twenty years he had been in the peculiar position of running a small works within 400 yards of which there had been bee-hive and non-recovery coke-ovens, which had carbonized as much coal in one day as he did in a month. He quite agreed with those speakers who had suggested that the gas-works was the proper place in which to carbonize coal, and that in future the Government should see that it was the place at which coal was treated. Still it had forced itself upon him that, as a gas engineer, it was his duty to try to do something with the gaseous products that had been simply burned to be got rid of in an immediately adjoining works. They could imagine his feelings. He would be using 10 tons of coal a day, and striving to get the very utmost out of it, whereas across the road there were people who were actually throwing away the whole of the bye-products, and doing next to nothing with the gas except burning it under the boilers, to raise such steam as could be secured by their methods. There was another point of view from which they, as gas engineers, would have to tackle this question. He, in his small way, dealt with the sister industry—the electrical business. He felt that there was no love like the old love; but unless they took some interest in the gas that was produced by these coke-oven plants, it was going to be utilized for other purposes. To-day they would find that these people did not propose to ask the local authorities to take gas from them, but rather they were going to utilize the huge quantity of gas that would be evolved from 5000 tons of coal a week to generate electricity; and this station was to be part of the scheme suggested in the Coal Conservation Committee's report. Thus the small gas-works in these districts would be up against a very serious problem indeed. This introduced the point as to whether it would not be better for the gas-works to at once face their difficulties, and take the supply. This matter of coal conservation was going to be a very serious one for the gas industry, unless the gas industry tackled it in a manner similar to that in which it had been attacked and dealt with by the electrical industry. Personally, he was pleased to see from the report of the Parent Institution that they did intend taking the matter up. The proposal of the Coal Conservation Committee was that, wherever there was surplus heat, or waste of steam, or that kind of thing, it should be converted into electricity and supplied in certain districts. If this were carried out in practice, small gas-works were going to be up against a very serious problem; but he doubted as to how far it would be in the national interests that such a scheme should be carried out. The bulk of the gas consumers of to-day were slot consumers; and each one used a cooker. Those in colliery districts, where colliers got their coal at a very low price, or for nothing, found that they did not derive the benefit from slot installations which others enjoyed, because they had not a cooker to balance the winter lighting load. The electrical people always found the same difficulty. Where slot installations were put on an electrical supply, the revenue in summer was so small that the installations in most cases did not pay without the fixing of a minimum charge. Taking all these points together, it seemed to him that, if the distribution of electricity was to be carried into industrial districts, it could be hardly worth while, or in the interests of national economy, that duplicate supplies should be run to cottage properties. Mr. Rees had said that a supply of gaseous fuel was essential for the inhabitants in the future. If they had a supply of gaseous fuel for cooking and heating, it would scarcely pay to run duplicate electric services for lighting, so long as sufficient light could be obtained at a low cost from the gas supply. He would like to make this point clear. They as gas engineers should take a serious view of what was happening with these coke-oven people. They had in the district 120 ovens being built, which would carbonize some 5800 tons of coal in a week. This was somewhere about three or four times as much as all the gas-works in the district did in a month; and if the power available was turned into electricity, they would have to meet the competition. On the other hand, if there was surplus gas which they themselves could purchase at a small rate, there would possibly be difficulties to overcome, but they would at the same time be preventing their competitors from getting the whole supply.

Mr. REES, replying to the discussion, said he was gratified at the reception accorded his paper, which he had told them he considered to be unorthodox. Nevertheless, he lived in a town which had great possibilities before it; and they were trying to look ahead a little. The gas undertaking was very heavily capitalized; and as soon as some of the present lighting restrictions were removed, they would have every retort going. This would mean a large extension of their plant; and they wanted to stave it off. Therefore, with a coking plant so near—the distance between the millionc. ft. holder of the coking plant and themselves was only about 150 yards—the matter did present itself to him strongly. The people were going to use the gas very largely themselves; but it was quite possible they would be glad to find an outlet for some of it. The demands of the iron and steel markets would, of course, vary; but it was pretty certain that quite one-half of the battery of ovens would be kept going continuously, because there would be a large station of the most modern type for the generation of high-tension current, and it was understood that they would distribute this current, not only to the immediate plant, but also to their sinkings at Margam, and their other colliery undertakings further east. He was himself a straight coal-gas man all the time; and he must agree with the remarks made that gas-works were the best places for carbonizing coal. But it was up to the gas industry to assist coal conservation; and if they could provide cheap gas, they were going to improve their rate of progress. He doubted very much, however, if the industry could expect much prosperity with the price of gas bordering as it did on 4s. per 1000 c.ft. While fully agreeing with Mr. Canning in his remark that the gas industry was still in front of the coking industry, it must be remembered that the latter was going ahead, and he believed was becoming alive to the fact that, while their primary object was metallurgical coke, more attention would have to be given to the quality of the gas supplied. Though the analyses did vary greatly in different parts of the country, the coke-oven manager would give the amount of attention to his plant which would provide them, if required, with a very suitable gas for domestic uses. Undoubtedly, with the methods of carbonization that were under consideration—vertical retorts, and so on—gas-works would provide large volumes of coal gas in the best and most economical manner, so that its price would be low and justify its extended use. But some of the speakers made more million cubic feet of gas per day than he himself did in a month; so that the point of view was not the same. He had taken particular care to point out that one of the difficulties in connection with coke-oven gas supplies was a reasonable guarantee of continuity of supply. In fact, the whole thing bristled with difficulties; but, in his opinion, they were not insurmountable. He did not see any coke in Middlesbrough, so he did not know how they were going to make water gas at a minute's notice. They were in the vicinity of towns which could provide it; but there was no coke actually on the spot. The quality of the gas at Middlesbrough was all right; and at the present moment they were using an exhauster and pumping a small proportion of air into it. They were Otto ovens, with a duplex main. For the first two or three hours they did not take off any gas for town purposes; and they did not take the tailing-off. What they had was the middle portion; and the quality was exceptionally good and regular. The gentleman in charge of this particular section of the coking plant—Mr. Wright—was an old gas man. The analysis he (Mr. Rees) had given was an average sample taken off the outlet of the ammonia recovery plant. It was an average sample without any preparation. Neither had the coking interest any finger at all in the pie. "D" was not an analysis given by a coke-oven chemist, but by quite an independent party. The figures bore very favourable comparison with the quality of the gas they were sending out to-day. The nitrogen content, according to the analysis, by difference was under 9 p.ct., which was not unreasonable. If the factors which had been mentioned were a bar to the adoption of coke-oven gas, the only natural conclusion was that they should still go on making straight coal gas by the best possible method; but he was convinced in his own mind that on a 50 million c.ft. plant, one could not use a small volume of coal to the same advantage as on a plant using 1000 tons a day. Of course, much had happened since his notes were put together; and he agreed, also, that a gas-works was the most desirable place in which to deal with coal. He had insisted that the surplus gas was not of so much importance to the coke-oven manager as the coke; but it was the business of the gas industry to take some interest in the surplus gas. It was still their business to supply gas for public and private needs at a price which would brook no competitor. Cheap gas was a factor after all. He was looking forward to the time when it would not be necessary to use domestic coke. If they could distribute gas at about 1s. 6d. per 1000 c.ft. everybody would have it. It was a matter of the greatest national importance that the use of coal should be conserved; and coal was best conserved when it was distilled, and gas consumed in its place. It was true that flame temperature was often confused with calorific value; and the composition of gas was a point to which more attention should be given. As to boosting, if gas could be had in bulk at the rate at which Middlesbrough purchased it—that was, at slightly over 2d. per 1000 c.ft., for 560 B.Th.U.—they could afford to spend £500 or £600 on a boosting plant. He did not suggest the closing-down of any gas-works. What he was anxious about was that the manufacturing and distribution systems should be utilized to the best advantage; and if they could double the output of the manufacturing plant with practically no cost, they were certainly going to be in a position to supply cheap gas, which was what they were out for. The price of gas had been naturally controlled by its high quality. If they were compelled to make a gas of which they could only produce 10,000 c.ft. per ton, they could not expect to sell it at 2s. per 1000 c.ft.; but if they could augment their supply with coke-oven gas at a few pence per 1000 c.ft., it might be possible to do so. Therefore, coke-oven gas was worthy of a trial. The coke-oven gas at Middlesbrough was not supplied from a colliery company, but by Sir B. Samuelson & Co., Ltd.; and, if his memory served him, the Middlesbrough contract was for a supply at the standard of their Act—16 candles.

Mr. THOMAS: 12-candle gas has appeared in the Press several times.

Mr. REES (continuing) said the quality of coal in South Wales was not comparable for gas-making purposes with that used in the North Country. The average volatile of the coal at Middlesbrough, according to Mr. Wright, was 27 to 28 p.ct.; while the volatile content of the coal of which he (Mr. Rees) had given an analysis was 23·8 p.ct. Though there were hosts of analyses of coke-oven gas that were not on the bright side, he thought on the face of the analysis he had given them from a coking plant in the county worked with a single main, the figures were really worth some little attention. The larger gas undertakings could look after themselves, by reason of the magnitude of their operations; but he did think, if small undertakings could utilize coke-oven gas as an adjunct to their coal-gas plant, it was up to them to use it, and assist the greater consumption of gaseous fuel.

The "Disintegrator" Washer.—This is the name given by the firm of Ed. Theisen, of Leipzig, to a patent purifier for all kinds of gas. According to "Stahl und Eisen" for Jan. 31 last, a single apparatus working on the parallel and contra-flow principle is said to cool and wash the gas and place it under pressure. The guaranteed degree of purity is 0·01 to 0·02 gram. (presumably per cub. m.) for engine gas and 0·1 to 0·2 gram. for heating gas, without pre-cleansing in both cases. The water consumption is 0·5 to 0·75 litre per cub. m.; and a single apparatus will deal with up to 60,000 cub. m. per hour.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Calorific Values per Ton and Inert Gas Constituents.

SIR,—Since you put to me a direct question in your article on p. 371 of the "JOURNAL" for the 28th inst., in courtesy I feel bound to reply; but I propose to do so by putting another. Whether is it better to obtain per ton of coal say 12,500 c.ft. of 500 B.Th.U. gas, or 15,000 c.ft. of 400 B.Th.U. gas.

My figures are based on actual results (but in round numbers); and the conclusion I arrive at is that there is a very material heat loss per ton of coal carbonized in obtaining the greater yield.

The succeeding article on the same page, and "Gas Engineer's" communication, are fitting sequels to the question you ask me, and are worthy of profound study.

If gas text-books are referred to, the percentage of inert constituents will be found to be given for many different localities in times past. Even as lately as 1904, in the case of one of the London companies, the inert constituents were under 6 p.ct.; whereas these have risen to 20 p.ct. and more in later years—particularly in the winter months. Those with experience of vertical retorts know that inert constituents are under 5 p.ct. It must, therefore, be concluded that the inerts are a consequence of the method of working and condition of plant, and are neither attributable to the class of coal used nor even to the type of plant employed.

Further, every gas engineer knows whence they come; and if the luminous test were reverted to, he also knows exactly what to do to prevent it.

Prof. Bone has told us that the value of a gas to the consumer is in direct relationship with its calorific value, and that more must be used to accomplish the same purpose in direct proportion to the reduction of the calorific value.

It might surprise many if (the data being available—and I have it for some notable instances) the yield in British thermal units per ton of coal carbonized was worked out over a period of years, during which the cubic feet make per ton was greatly increased. In many cases, it would be found that the increase in cubic feet is entirely due to an increase in the percentage of non-combustible matter in the gas.

The liberty taken with the gas supply in some localities to-day, is not only unfair to the consumers and uneconomical in results, but it is also unfair to other undertakings striving to supply a gas of normal quality, and succeeding in doing so, within reasonable limits.

There is no advantage in supplying a grossly inferior gas at an increased pressure, in order to force through the present burner nozzles the increased quantity required to do the work, and even then having to supply ferrules for closing the air-ports in the bunsen tubes.

Howard House, 4, Arundel Street, Strand, May 30, 1918. W. R. HERRING.

Stresses in Gasholders.

SIR,—Nothing further need be added to my criticism of Mr. Robinson's paper on "Gasholder Stresses," inasmuch as he has not only failed to confute a single point in my criticism, but has simply added another inaccurate letter, which, however, can scarcely deceive any properly trained and practical engineer.

As to the "students" and others for whom Mr. Robinson professes to have catered, it is to be regretted that one is forced to warn them that, by accepting his theories, graphics, &c., they would be following a most dangerous course.

The fact that my copyright work on gasholder stresses is out of print is no justification for what he did, as explained in the opening paragraphs of my criticism, and for which he has not even expressed regret, although he must know he misrepresented the facts.

Referring to the suggestion that my book should be republished. In war time this cannot be, as both paper and labour must now be economized to the fullest extent. F. S. CRIPPS.

Slinfold, Sussex, May 30, 1918.

Salaries at Bradford.—Referring to the paragraph intimating the granting of a long list of increases of salary at Bradford, "conditional on fees received by any official in respect of work done for a Government department or other public authority being handed over to the Corporation," Mr. F. Ogden Whiteley (the City Treasurer) writes that the words quoted "do not accurately represent the position, and may give an erroneous impression. The resolution of the City Council dealing with the payment of fees and emoluments received by all officials of the Corporation into the Corporation funds, was a separate one from that dealing with advances of salary, and affects not only those whose salaries were advanced on that day, but the whole of the official staff."

Chelmsford Gas-Works Profits.—The Secretary of the Chelmsford Corporation Gas Department has submitted the accounts of the undertaking for the year ended March 31 last, showing a gross profit on revenue account of £6628 and a net profit of £2083.

Limerick Gas Order.—The Limerick Corporation have now obtained confirmation of the Local Government Board Order empowering them, for the period of the war and not exceeding two years thereafter, to make the maximum price of gas 6s. instead of 5s. per 1000 c.ft., with 7s. instead of 6s. for consumption outside the borough boundary, and so in proportion for any smaller quantity. The price is to be the same for all consumers, and to include meter hire.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Progress of Bills.

The Examiners reported that the Standing Orders had been complied with in the case of the Wandsworth, Wimbledon, and Epsom District Gas Bill. The Wandsworth Borough Council have lodged a petition against the Bill.

The Aldershot Gas, Water, and District Lighting Bill was read a second time, and committed.

LEGAL INTELLIGENCE.

THE BRIGHTON GAS COMPANY TO APPEAL.

Referring to the report given last week (p. 384) as to the conviction of the Brighton and Hove General Gas Company, by the Brighton Magistrates, for failure to supply gas of the standard calorific power, the Company, acting on advice, have appealed to Quarter Sessions to quash the conviction on various grounds—among others, that it was proved that any deficiency of calorific power was caused by circumstances beyond the control of the Company, which alone would be a sufficient defence to a prosecution for a penalty under the Company's Act of 1910. Application was made to the Borough Bench yesterday week to fix the amount of the recognizances in the matter of the appeal. It was suggested that Mr. Joseph Cash, one of the Directors of the Company, should be the person from whom the recognizances should be taken. The Magistrates accepted Mr. Cash, and fixed the recognizances at £10 in each case—£170 in all.

The Company's Solicitors (Messrs. Howlett and Clark) have written the following letter to the local newspaper: Our clients have received many letters from consumers making various claims based upon the above-mentioned convictions. To save them and our clients trouble, we should like to point out that they have no claims they can substantiate, as it has been decided that there is no right of action against a company performing a public duty under an Act of Parliament which subjects it to a penalty for non-compliance with certain obligations contained in that Act.

Enemy Coal-Tar Dye Patents.

Messrs. J. B. Holliday & Co., Ltd., of Huddersfield, applied in the Patents Court on Wednesday last for licence to use 23 German dye patents. Stating the case for the applicants, Mr. Colefax, K.C., said the Company had carried out important research work with the licences already granted them, and had invented an entirely new and very remarkable colour. The patents asked for dealt with sulphur colouring, new sulphur dyestuffs, phthalic acid derivatives, anthracene series, acid chloride, anthracene compounds, anthraquinone series, azo dyes, azo, ortho-axy-azo colouring, disazo, azo colouring, new polyazo dyestuffs, trisazo dyestuffs, new acetyl compounds of the amido-azobenzone series, &c. The Controller of Patents said the licences asked for would be granted. Messrs. Holliday & Co. had done admirable work already. Next week British Dyes, Ltd., would be applying for fifty more patents. The royalty fixed hitherto had been 2½ p.ct. on the final product and 1 p.ct. for intermediate products; but if, with the increasing cost of raw material and the continuance of the war, this arrangement seemed inequitable, and the higher prices prejudiced producers and consumers by increasing the royalty, licensees might come to the Court together in a body and ask for the royalty to be based on a weight basis.

Price of Gas at Bournemouth.—At a meeting of the Bournemouth Corporation Lighting Committee, a letter was read from the Gas and Water Company, stating that the Company had now had the wages award, and had been instructed to give an increase of 4s. per week to each of their employees, *plus* 12½ p.ct. bonus on their total wages. This would mean an increased expenditure necessitating a further increase in the price of gas at Midsummer.

Maximum Price at Shipley.—The result of the recent inquiry at Shipley into the Council's application for power to increase the maximum price of gas to 6s. 3d. per 1000 c.ft., is sanctioned by the Local Government Board, subject to parliamentary confirmation, to fix the maximum at 5s. 5d., which the Board consider to be adequate. The present maximum of 4s. 2d. is being charged at Shipley; but it was stated at the inquiry that the Council did not at present anticipate charging the 6s. 3d. for which they applied.

The Year's Work at Dukinfield.—Reporting on the balance-sheet for the year ended March 31, Mr. William Lindley, the Manager of the Dukinfield Gas-Works, says that, owing to the shortage in coal supplies, the quality was not up to standard, so that there was a considerable decrease in the make of gas per ton of coal carbonized. The sales, at nearly 86 million c.ft., show a slight increase. The gain would have been greater, but for the munitions works explosion at Ashton-under-Lyne last June, when the gas-works sustained very serious damage, causing the make of gas to be suspended for three weeks. The make per ton was 11,166 c.ft., as compared with 11,757 c.ft. for the previous year; the unaccounted-for gas for the two years being, respectively, 10·85 and 12·02 p.ct. The financial result for the past year is a gross profit of £2657, and a net loss of £749.

MISCELLANEOUS NEWS.

LONDON GAS CHARGES.

The "Financial Hardships" Proposals.

The letter to the "Daily Telegraph" by Mr. A. L. Leon, Chairman of the Public Control Committee of the London County Council, which was reproduced on p. 386 of last week's "JOURNAL," was replied to in the following terms by Mr. D. Milne Watson, the Managing-Director of the Gas Light and Coke Company:

My attention, as Chairman of the Executive Committee of the National Gas Council of Great Britain and Ireland, has been directed to the letter from the Chairman of the Public Control Committee of the London County Council. This letter conveys the impression that the matters with which it deals concern only London gas consumers, whereas in fact the questions involved arise out of the promotion by some twenty-four different gas companies (including the Metropolitan gas companies) of Private Bills seeking for a temporary modification, in the present abnormal circumstances, of the provisions of their existing Acts relating to price and dividend. These questions concern not only the Metropolitan companies and other promoters of Private Bills, but a large number of companies who are not promoting Bills.

When the pending Bills came up for consideration by the House of Commons on the second-reading stage, it was intimated by the President of the Board of Trade that he intended to propose the setting up of a specially chosen Committee to consider the question of principle involved. On that occasion Sir Henry Harris, M.P., speaking on behalf of the London County Council, stated that he did not think that any body would desire to oppose the proposal. The Select Committee was in due course set up, and gave a full hearing to the case for and against the proposition of the companies, as presented by counsel and witnesses for the companies and for the London County Council and other opposing local authorities, including all the arguments contained in Mr. Leon's letter. The Committee have not yet issued their report; but it has been announced that they will meet on Wednesday, May 29, presumably for the purpose of considering the terms of their report.

In these circumstances, it appears to me to be a matter for regret that the London County Council should have thought fit to address an *ex-parte* communication to you for publication while the matters dealt with are still *sub judice*, and at a time when the terms of the report of the Select Committee may be supposed to be undergoing final consideration by the members of the Committee. One would have thought that a public body so familiar as the London County Council are with the regular methods of conducting parliamentary proceedings, having expressly agreed to the setting-up of the Select Committee, and elected to state their case before that tribunal, would at least have awaited the report of the Committee before opening a new campaign of hostility.

Two other letters on the subject appeared in the same issue of our contemporary. The writer of the first—Mr. W. Worringham—said: It appears to me that Mr. Leon fails to see or appreciate the immense services rendered to the public by the gas companies in supplying cheap gas for lighting, heating, cooking, and for the making of munitions; and he says nothing of the still greater services rendered in making and supplying the numerous and valuable bye-products so necessary for carrying on the war. If the gas companies were allowed to charge more for their bye-products, the price of gas could be reduced and the dividends maintained. Mr. Leon somewhat *camouflages* his case when he says the capital has been multiplied two-and-a-half times, ignoring the fact that when this was done the Gas Light and Coke Company's ordinary stock stood at about 325, equal to an equivalent of (say) 162 to-day, or two-and-a-half times to-day's value of 65 per £100 of stock; so that shareholders have seen their capital fall by one-half since the conversion. Moreover, large blocks of capital stock have been placed at auction at 115 to 120, against to-day's value of 65—little more than one-half; and this was done in perfect good faith at the time, and on the assurance that the dividends would be assured and maintained. It is not reasonable to expect shareholders to find the capital without a fair and proper return, for the mere pleasure of supplying gas to the public for nothing. Mr. Leon must be well aware that, unless dividends are forthcoming, capital would not be obtainable for future extensions and the cheapening of gas.

Mr. C. S. Quartermaine wrote: In the past the sliding-scale has, on the whole, worked very fairly for all parties, though from time to time, when it was considered the companies could afford it, a revision of the scale in favour of the consumers has been effected. Why should not the reverse hold good in such abnormal times as the present? Mr. Leon points out that some years ago the capital of the Company was multiplied two-and-a-half times; but he omits to state that a very large part of this capital was raised under the auction clauses, whereby about £250 was obtained for each £100 original stock. So that the multiplication he refers to brought us back to a more accurate state of affairs than previously existed. Mr. Leon also says that by the abolition of maximum dividends the London companies have been able to divide £6,500,000 more in dividends. But according to his own argument six-sevenths of any increase or decrease in profit falls to the consumer. So that, while the stockholders may have benefited to the extent he names, the consumers have received no less than six times the amount—*i.e.*, £39,000,000.

Colonel Burn has given notice that he will in the House of Commons ask the President of the Board of Trade to-morrow "if he proposes to sanction the attempt that is being made by the gas companies to abrogate the sliding-scale which has been in practice since 1875, and by means of which, during a period of high prices, the increase of cost has been divided between the company and the consumer, seeing that this change will enable the companies to pay an increased pre-war dividend entirely at the expense of the consumer."

ELECTRIC POWER SUPPLY COMMITTEE.

Report and Recommendations.

The report has been issued of the Committee (presided over by Sir Archibald Williamson, Bart., M.P.) on Electric Power Supply, appointed by the Board of Trade "to consider and report what steps should be taken, whether by legislation or otherwise, to insure that there shall be an adequate and economical supply of electric power for all classes of consumers in the United Kingdom, particularly industries which depend upon a cheap supply of power for their development."

Shortly after the appointment of the Committee, the reports of the Coal Conservation Sub-Committee of the Reconstruction Committee, and of the Electrical Trades Committee appointed by the Board of Trade, were laid before them. In view of the investigations of these Committees, and other information, they, in May, 1917, unanimously came to the following conclusions:

(1) That when British industry is subjected to the test of keen international competition after the war, its success will depend upon the adoption of the most efficient methods and machinery, so as to reduce manufacturing costs as much as possible.

(2) That a highly important element in reducing manufacturing costs will be the general extension of the use of electric power supplied at the lowest possible price; and it is by largely increasing the amount of power used in the industry that the average output per head, and, as a consequence, the wages of the worker, can be raised.

(3) That the present system, under which a supply of electricity is provided in a large number of small areas by separate authorities, is the result of a policy adopted at a time when the applied science of electrical engineering was in its infancy, and is incompatible with anything that can now be accepted as a technically sound system.

(4) That the inter-connection of existing electrical supply stations, recommended by the Board of Trade in May, 1916, however desirable in itself, cannot alone meet the requirements of the situation.

(5) That a comprehensive system for the generation of electricity, and, where necessary, re-organizing its supply, should be established as soon as possible.

It was then decided to invite representative associations throughout the country to give evidence with regard to the best methods of giving effect to these conclusions. A number of witnesses were subsequently heard. The Committee considered the terms of reference from a national point of view, and went fully into the past and present conditions of electricity supply. Among other things, they remark that the efficiency and wide extension of the gas industry has to some extent accounted for the fact that electrical progress has been slower than might have been expected, especially in the smaller towns and villages. The most pressing need for electrical development is in those directions in which gas can least efficiently compete. They were glad to hear from important witnesses representing the gas interests that they look forward to more mutual assistance in the future between gas and electricity undertakings in the public interest. Turning to the future outlook, they set out some of the conditions governing a cheap supply of electricity. These comprise: (1) Combined generation within suitable areas. (2) Well-situated stations, having regard to condensing water, fuel, and distance from consumers. (3) Modern and large units of generating plant. (4) Uniform standards of system, frequency, and pressure, so far as now practicable. (5) Greater freedom for overhead wires and wayleaves. (6) Good technical and business management. (7) Adequate and cheap capital. To these, they say, might be added reduced valuations for rating purposes, especially in the case of transmission lines, and the economies which may be obtained by gasification of coal and recovery of bye-products in certain districts.

Subject to the conditions set out in the report, the chief recommendations of the Committee, briefly summarized, are:

(*a*) That a new body, to be called the Electricity Commissioners, should be set up, to whom should be transferred the existing powers of the Board of Trade, Local Government Board, Local Government Board for Ireland, and Scottish Office, relating to the supply of electricity, and to whom large additional powers should be given for regulating and encouraging the generation and distribution of electricity.

(*b*) That the Electricity Commissioners should, subject to an appeal to Parliament in certain cases, have general control over the generation and distribution of electricity in the United Kingdom.

(*c*) That the existing system under which electricity is separately generated for small areas should be abolished.

(*d*) That the Electricity Commissioners should, after local inquiries, divide the United Kingdom into districts technically suitable for the economical generation and distribution of electricity.

(*e*) That in each electrical district a District Electricity Board should be set up, which should purchase all generating stations of authorized distributors, whether local authorities, companies, or power companies.

(*f*) That the District Electricity Board should be responsible, by themselves or their lessees, for the future generation of electricity in their district, and for the establishment of new generating stations and proper systems for the main transmission of electricity in their district.

(*g*) That existing electrical undertakers should, if they so desire, retain their power of distributing electricity within their local areas, but should purchase electricity in bulk from the District Electricity Boards or their lessees; due provisions being made for controlling the profits of distributors so as to ensure a cheap supply of electricity to consumers.

(*h*) That District Electricity Boards should make no divisible profits.

(*i*) That District Electricity Boards should be financed, in whole or in part, by funds raised with Government assistance, except

where it is shown to be desirable and practicable to finance the Boards locally.

(*j*) That largely extended powers should be granted for, *inter alia*, (*a*) The use of overhead wires; (*b*) wayleaves; and (*c*) acquisition of water rights.

In view of the fact that the numerous investigations of the Reconstruction Committees, and the proposals made by them, must largely depend for their practical effect upon the supply of cheap power, the Committee emphasize the importance of initiating the necessary legislation with the least possible delay.

NOTTINGHAM GAS UNDERTAKING.

A Profit of £123,663.

The annual report of the Nottingham Gas Committee, presented at yesterday's meeting of the Council, showed that the profit earned in the past year amounted to £123,663, of which £30,000 is to be applied in reduction of the district rate. Adding £26,662 for balance brought forward and bankers' interest, the total amount available is £157,413, or over £37,000 more than in the preceding year. After deducting interest on capital, sinking fund contributions, and depreciation of stoves, £93,447 remained at the disposal of the Council. The amount set aside in relief of rates is the same as in 1917. Thus, the gas undertaking has again been relied upon to come to the rescue; and this has been rendered largely possible from the circumstance that the Committee have experienced the advantages of favourable purchases of coal, which, with discriminating foresight, was put into stock a few years ago and carbonized during the last twelve months. But while the rates benefit, the process of sound finance is again well exemplified by the consideration paid to the renewals fund, to which £30,000 is this year being devoted, or £20,000 more than in 1917; while £5000 is added to the reserve fund, which is now £219,337. The renewals account is also represented by £90,270. The Committee have effected admirable results; and though in the process an increase of charges to consumers both for lighting and power purposes has been rendered inevitable, the advance compares not unfavourably with larger rates, which many other towns have found it necessary to impose. To their other substantial financial resources, the Committee have added £185,500 by investment in war stock since hostilities began.

The quantity of gas sold last year, to which Government ordnance works have contributed substantially, shows a large increase upon the previous year; having amounted to 2,224,670,300 c.ft., compared with 2,085,131,600 c.ft. The gas sold per ton of coal carbonized was 12,004 c.ft., against 11,802 c.ft. The gas sold for public lighting was only 3,690,000 c.ft., compared with 102,143,500 c.ft. at March 31, 1914. Anticipating possible criticism, the report adds: "The Committee realize the importance of keeping the charges for gas as low as possible; but the position with regard to the prices and supplies of coal, chemicals, general materials, and labour still remains very acute." The increase of approximately 2½d. per 1000 c.ft. for gas used through ordinary meters for all purposes other than for power, "gassing," and motor vehicles came into operation at the end of the Michaelmas quarter, 1917; the new charges representing an increase of 6d. over pre-war rates. Ready markets and good prices for coke, ammonia products, crude carbolic, cresylic, creosote, and naphthalene have prevailed throughout the year. The outlook for pitch has also improved; but prices are still very low.

Further substantial advances of war wages and bonuses have been granted to the workmen since the issue of the last annual report. The Committee are now reluctantly compelled to obtain supplies of coal from Durham, instead of from the usual source; and this has rendered the position both difficult and expensive. The Committee have, by arrangement, handed over to the Government the Radford Gas-Works (where the installation of the first vertical retorts in Nottingham of the Glover-West type was made) on certain terms for the period of the war; and the works and plant are now being utilized for the purpose of increasing the production of mineral oil. The record generally is characterized by the Committee as being much more satisfactory than was anticipated, in view of the advance in prices of all materials, war bonuses, &c.

Mr. John Wilkinson's Report.

In his seventh annual report, appended to that of the Committee, the Engineer and General Manager (Mr. John Wilkinson) states that during the period under review 178,127 tons of coal, 321 tons of pitch, and 90,286 gallons of oil were utilized in the course of manufacturing the following products: Coal gas, 2,204,882,000 c.ft.; water gas (equalling 4·5 p.ct. of the total gas made), 105,646,000 c.ft.; coke (for sale), 76,447 tons; tar, 10,813 tons; ammoniacal liquor (10 oz. strength), 25,514 tons. The quantity of tar manipulated at the Giltbrook chemical works was 2,115,330 gallons. The works were also used for the manufacture of 1966 tons of sulphuric acid (100 p.ct.). At the Basford ammonia works, the equivalent of 26,229 tons of 10 oz. ammoniacal liquor was distilled. The installation of vertical retorts at Basford (of the Woodall-Duckham type) is still in the hands of the Contractors; certain reconstruction work having been found necessary. The figures indicate an increase of 150,538,700 c.ft., or 7·65 p.ct., when compared with the sale of gas for the previous year. They include, however, 14,363,800 c.ft. as adjustment of accounts for the previous year. The gas unaccounted for during the year was 2·85 p.ct., as compared with 5·13 p.ct. for the previous year. The total length of mains laid at March 31 was 408·23 miles; and the number of meters fixed, including 481 lamp meters, was 83,814. The position of gas in regard to its application for trade and domestic purposes, other than lighting, has been maintained; and on March 31 there were in use about 35,206 cooking-stoves, 19,888 gas-fires, and 838 gas-engines.

The expenditure for coal for the year ended March last was £167,135, and for the two preceding years £155,400 and £124,455 respectively. The receipts for residuals for the year up to March last totalled £125,077; the figures under this head for the two preceding years being £118,813 and £102,810. The Radford works and plant are now producing mineral oil of excellent quality; and members of the Committee, Mr. Wilkinson observes, are to be congratulated upon the promptitude with which they negotiated the matter with the authorities in London. The action of the Committee generally was highly appreciated by the Controller of the Mineral Oil Production Committee.

A PIONEER OF MUNICIPAL "GAS PROFITS."

How Manchester's Non-Consumers of Gas Secured a "Princely Revenue."

Columns upon columns of matter have appeared of late in the Manchester morning, evening, and weekly newspapers regarding the report of the Trading Departments' Profits Committee; and in this connection Mr. Fredk. A. Price, the Superintendent of the Corporation Gas Department, points out that the late Mr. Thomas Fleming, who was born in Manchester in 1767, was probably the originator of the policy of subsidizing the rates out of gas profits, and is, consequently, responsible for many controversies on the subject—especially since the policy has been extended to all trading departments of municipal corporations.

In the Manchester Cathedral there is a full-length monument in stone to the man who thus achieved fame, and who died June 28, 1848. Below the inscription are the following words:

During a long life . . . he devoted an extraordinary degree of mental and moral energy to the improvement of his native town, in which those who survey its valued Institutions and spacious streets will find few which do not bear tokens of his disinterested, successful, and long-continued services. Among the benefactors of Manchester, his ardent zeal, enlightened public spirit, and determined perseverance—evidenced by the labours of half-a-century, and particularly by the measure which secured a princely revenue to the town—the appropriation of gas profits to public purposes, entitle his name to be permanently recorded; and among the examples which he has produced of a consistent and conscientious discharge of all public and private duties, . . . the one he has afforded will not soon be forgotten.

PRIMITIVA GAS COMPANY OF BUENOS AYRES.

In the report which they will submit to the seventeenth annual general meeting next Thursday, the Directors express their regret that the revenue for the twelve months ended Dec. 31 is again not sufficient to meet the fixed charges and expenses; there being a loss shown on the year's working of £744.

Gas coals have been very scarce and dear all the year—indeed, it has been almost impossible to ship them at any price; so that the Company have been obliged to turn to any substitutes available, and have used in the retorts 107,000 tons of hardwood, 5700 tons of bran, and 1000 tons of peat and sawdust. The quantity of coal available was 24,800 tons; and the cost was £4 11s. 9d. per ton, as compared with £3 4s. 5d. in 1916, £2 2s. in 1915, and £1 14s. in 1914. What little they are able to ship at present costs about £7 15s. per ton; and the quality is not nearly as good as it was in pre-war days. Though the Arbitration Court, constituted to resolve the various questions between the Municipality and the Company, decided in February last, after long delay, that the Company are entitled to a considerable increase in the selling prices of gas, they have not yet obtained the sanction of the authorities to charge the higher prices, owing to the delays in the constitution of the Municipal Council. The Municipality owed the Company at the end of 1917 no less than £133,500, which indebtedness has been considerably increased since that date. Capital expenditure has naturally been reduced to a minimum; and the network of mains has only been increased by a fraction of a mile—the total being 1138 miles. The number of private services fixed shows a falling off of 308 as compared with 1916; the total at the end of 1917 being 201,435. The Company's works have been maintained in full and efficient repair out of revenue. It has been again impossible to make any provision for the Retiro amortization; and to this account there has been added a sum of £87,175, being the cost of certain plant which has been demolished, and which has been accordingly taken out of the land, buildings, and plant account. It was anticipated that this sum would have been provided by sales of land at prices in excess of the book values. But this policy has been delayed owing to the war; and the above transfer has therefore been made.

A Tar-Dehydration Plant Refused for Chelmsford.—The Chelmsford Corporation Gas Manager (Mr. E. W. Smith) reports having communicated with the Priority Committee of the Ministry of Munitions, in order to ascertain if permits would be granted for the erection of a tar-dehydration plant at the gas-works. He is informed that the Department "regrets to find itself unable to hold out any hope" that a priority permit would be issued for the plant.

Chelmsford Gasholder Contract.—A letter from Messrs. C. & W. Walker, Ltd., asking the Council to meet them in the loss they have sustained through the carrying-out of the contract for the erection of the new gasholder, has been considered by the Chelmsford Corporation Gas Committee. In their final account, the firm showed that the actual total cost of constructing the holder which the Corporation were legally liable to pay amounted to £10,120; but the net loss incurred by them, through the increased cost of labour and materials, and other circumstances arising out of the war, was £804. This did not include the profit allowed for in the original contract price. The Committee point out that the contract was not a pre-war one; and that Messrs. Walker withdrew their first tender (£9780), and substituted for it the £10,100. While regretting the loss, the Committee say they see no reason why the Corporation should defray a proportionate share of such loss in respect of which they are not legally liable.

BOMBAY GAS COMPANY, LTD.

The Ordinary Meeting of the Company was held last Thursday, at the London Offices, Moorgate Station Chambers, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. A. Dickson, Jun.) read the notice convening the meeting and the report of the Auditors; and the Directors' report and statement of accounts were taken as read.

INCREASED SALES.

The CHAIRMAN, in moving the adoption of the report and accounts, said it was a little unusual nowadays at a meeting of a body of shareholders to put forward a recommendation even for a slight addition to the dividend of the previous year. They all of them knew that with English companies the story was very much the other way—in fact, they had sought relief from Parliament from some of their obligations; and he read in that morning's papers a note which encouraged the hope that they might be to some extent successful in their application. Notwithstanding the effect of the war upon the Bombay undertaking as regards the cost of materials—it had been very difficult to get materials at all—and labour, the Company had been fortunate during a year of war and difficulty in getting the very good increase of 11¼ p.ct. in the sale of gas. He would, however, be misleading the shareholders if he got them to think that this advantage could be maintained without the very greatest and best efforts of their staff and the Directors, because the conditions were tightening. In the matter of coal, while they had fortunately been able to secure coal for some little time ahead at a definite price, a fact which had encouraged the Directors in taking a step which he had to announce—viz., of making a reduction in the price of gas—nevertheless, they might find it very difficult to be sure that they would obtain this coal in suitable quantities. They knew what the Coal Controller was doing in England; and he was sorry to hear there was a Coal Controller in India, who had put his foot down rather stringently, and was controlling the extent to which the Company received their coal. The railways, too, which were much occupied generally for military purposes, were also under much the same difficulties as they were in England to-day. The profit showed an addition for the year of £67. They would see that this was a very small amount to get when on the other side of the account the income from the sale of gas showed an increase of £1140, residuals were greater by £1321, and there was a sort of sporadic receipt from fittings of £745 against last year. It was rather difficult to appraise these things exactly. Public taste in Bombay, he supposed, ran somewhere on the particular form of fittings that they happened to have in stock, although Mr. Burch did not seem to be able to assure them that they would always have a corresponding income. These figures, however, together with small variations in other receipts amounting to £56, gave an increased income of £8062. The additional profit of £67, as shown by the £30,035 against £29,968 for the previous year, did not seem to be very much; but the Directors were satisfied that it was adequate. The expenditure on wear and tear of plant and other things could not be much when the materials could not be got at all in the way they were accustomed to get them. These were not times in which to spend so much as they would like to, nor could they if they tried; so that the expenditure on wear and tear was slightly diminished. As against £8061 more receipts, coal had cost £5548 more, public lamps £454 (not a very considerable item), rates £1605 more—so that rates had a tendency to increase, even in India—management expenses had increased by £834 (chiefly due to general charges amounting to £483 connected with details of administration which he need not specify), and general charges amounted to £1871, compared with £1389 last year. This increase was reduced again by various small items that he should only weary them with by going into seriatim. There was an increase of £7995 in expenditure, against £8062 increased receipts; leaving £67 additional profit. This result was because they had secured coal ahead, and because they were satisfied with the amount that had been spent on repairs and upkeep of works—a matter on which he was always jealous in connection with declaring dividends.

A REDUCTION IN PRICE.—THE PUBLIC LIGHTING CONTRACT.

The Directors had thought it the occasion to make another reduction in the price of gas, by an amount in English figures of 4d. per 1000 c.ft. This he regarded as a wise step. They had not yet secured the new public lamp contract, which had been held in suspense during the past three or four years owing to the war. The tender for a further period, although prepared some time ago, had not yet been considered by the Municipality owing to the war; and it was encouraging from the Company's point of view to think that the price which they would be able to tender to the Corporation for the lamps would be on correspondingly lower terms, because the reductions that had been repeatedly made during the last six or seven years had been so considerable, and at the same time had enabled the Company to maintain their dividends. As a matter of fact on this occasion they were paying an extra ½ p.ct., which was fully justified by the circumstances. He did not think he had anything else to point to, except that the additions to capital expenditure were very small—only £74 on mains and services. There was an actual diminution in the expenditure on meters, because they could not get new ones. The Company were, in fact, reduced to the expedient of taking meters away from small consumers who were not very profitable because they were not using gas continuously, and putting them into new consumers' premises, instead of having new meters. Mr. Burch, their Manager in Bombay, was present; and it was very satisfactory to see him. He had come away in a hurry, because he was not feeling quite well. He had not had a holiday in his ordinary turn, and had come home to confer with them. As they all hoped that before long this terrible war would be over, and they would be signing the fresh contract for the public lighting, it was perhaps fortunate that they were able to have a discussion with Mr. Burch. Generally, with regard to the administration of the works, as far as Mr. Burch and his accomplished Assistant (Mr. Lane) and the good foremen they had, they continued to perform their duties with regularity, zeal, and efficiency. The amount of gas made per ton of coal was extremely good. It could not be beaten in any English works, and perhaps there was something to say for this on account of the coal.

THE QUESTION OF AMMONIA.

Then the amount of coke realized and the quantity of tar was very good; and while they did not get anything from the ammonia at present, they hoped to be able to arrange terms with contractors which would enable the Board in future to show considerable receipts from ammonia. This was a very important branch, and it was important not to waste. If they did not take the ammonia out, it accumulated; and it was not an agreeable substance to have accumulating. If they did take it out and treated it, they would be furnishing their neighbours in India and helping to furnish the world with what he might call the world's fertilizer, because wherever vegetation grew sulphate of ammonia was very valuable. It used to be £24 a ton, and was used to replace or fortify guano which in the deposits had become weakened through exposure to the weather, and did not have the value which the British farmer was accustomed to. It was impossible to produce too much ammonia. It was valuable for making explosives. But leaving this aside, and looking at it from the productive point of view, the use of ammonia was extremely valuable. The Board had been considering the question of working it themselves, as English gas companies did; but when he told them that sulphuric acid could not be bought in Bombay, and that they could hardly get a ship to freight it out, they would see that it meant a double problem, which was one from which neither he nor the Board would shrink, and that was to produce the sulphuric acid themselves. It was an initial advantage of the distillation of coal that one produced ammonia among its so-called impurities; they also produced sulphur which, when properly treated, was capable of fixing the ammonia. Therefore they could produce everything they wanted. In a well-conducted gas-works there was no need to waste anything, not even the clinker from the furnaces, which could be used for road-making purposes. Nothing need be wasted at a gas-works, not even a nuisance, because they could not afford to have a nuisance—even that was valuable if they kept it to themselves. He would later move a vote of thanks to the staff and workmen; but he would now confine himself to moving the adoption of the report of the Directors and the statement of accounts.

Mr. W. G. BRADSHAW having seconded,

The CHAIRMAN said that if any shareholder would like to ask any question about the position in Bombay he would ask Mr. Burch to give details.

The motion was unanimously carried.

The CHAIRMAN moved that the final dividend for the year to Dec. 31, of 4½ p.ct., less tax at the rate of 3s. 9d. in the pound, be declared payable on June 1; making, with the interim dividend of 3 p.ct., 8 p.ct. for the year. He thought the shareholders were to be congratulated—at any rate he congratulated himself—upon having their dividend slightly increased, instead of, as was the case with many other companies, diminished.

Mr. CHARLES HUNT seconded; and the motion was carried.

Mr. W. G. BRADSHAW moved that the retiring Directors—Mr. H. E. Jones and Mr. Charles Hunt—be re-elected. They were very proud of their Chairman, who was the grand, not old man, but the grand man of the gas profession. He had held, or was holding, every office of distinction which a gas engineer and administrator could possibly hold; and last year he had added to his other distinctions that of the blue ribbon of the civil engineering world. He was now President of the Institution of Civil Engineers—the highest position which the profession could give him. Therefore he was justified in saying they were proud of their Chairman. What the Company owed to him would take too much time to describe then; but he could only say that any company having Mr. Jones as its Chairman was in a very fortunate position. When he came to Mr. Hunt, they all knew that, wherever able administration and engineering knowledge were spoken of, Mr. Hunt's name was a household word. In Mr. Hunt and Mr. Jones they had two ideal Directors for any gas company in the world. They were most fortunate in having them; and he had very great pleasure in moving their re-election.

Field-Marshal Sir EVELYN WOOD, V.C., K.C.B., seconded the motion.

Mr. SAMUEL SPENCER, in supporting the motion, remarked that two or three years ago he had ventured to express the hope that Mr. Jones would be President of the Institution of Civil Engineers; and now he had arrived at that position. He had known both Mr. Hunt and Mr. Jones almost too long to say, and could speak in full accord with what Mr. Bradshaw had said.

The motion was put to the meeting, and carried unanimously.

Mr. JONES, in replying, said that his brother veteran and himself were extremely indebted to the meeting for supporting the vote. He was very glad to have Mr. Hunt as his comrade-in-arms, and they would continue to place their experience, which had had time to get ripe, whether it was or not, at the service of the Company.

Mr. HUNT thanked the shareholders for his re-election.

On the motion of Mr. F. R. SMITH, seconded by Mr. SAMUEL SPENCER, Mr. Spencer Gore Browne and Mr. Ernest W. Drew, F.C.A., were re-elected Auditors for the ensuing year.

A TRIBUTE TO THE STAFF.

The CHAIRMAN said it now became his privilege to move a vote of thanks to the Manager, staff, and workmen in Bombay, not forgetting the staff in London. He had forgotten to explain the absence of their worthy colleague on the Board (Mr. Penny), who unfortunately was detained at home by illness, which prevented him travelling. With regard to the staff, he had already spoken of the exemplary working in Bombay, which was in every way creditable. Generally, they were working under the great disadvantages of the intense heat. Yet they had never failed to give good service. The figures had been given to the meeting for many years, and the story had always been one way up to now, except on one occasion, when the price of coal lowered the dividend by ½ p.ct. Except for that one occasion, when the dividend went down to 7 p.ct., it had been 8 p.ct. for many years. This was not done without a considerable amount of trouble. At one time it

was an extremely anxious question to arrange for coal, which had even been brought from Australia. He was now specially gratified to think, and they would be gratified to know of the satisfaction of the Board, that they were now able to employ native coal to a very large extent; and this was a considerable advantage. He must not forget before sitting down to include in the vote their excellent Secretary and his staff, which consisted at present of no other male, but two ladies—and very efficient, energetic, and zealous officers of the Company they were, and they should be added to the vote.

Mr. BRADSHAW seconded, and the vote of thanks was carried with acclamation.

Mr. A. R. BURCH, the Engineer and Manager in Bombay, said he would like to thank the Chairman very sincerely for what he had said, and the shareholders for so kindly passing the vote of thanks. They had been very lucky in Bombay during 1917, because trade there had boomed, especially the mill industry and the allied industries. This prosperity reflected on the prosperity of the whole place; and they had been fortunate in being in that position. At the same time, there were very severe anxieties arising out of the war. The coal supply was most uncertain, and they were not actually getting the coal which they had contracted for. Labour was another difficulty, as also was the supply of materials; and it would be realized, when it was remembered that they had to be taken such a long distance with the prohibitions that existed, that it was a grave anxiety to carry on. But, speaking on behalf of Mr. Lane, the staff, and himself, he was always confident of one thing, and that was as long as they had a Chairman and Board behind them such as were now in office they would face anything with confidence in the future.

The SECRETARY, also replying to the vote of thanks, thanked the Chairman for the very kind remarks he had made with regard to the services of the staff, and the shareholders for kindly endorsing them. They had had a somewhat strenuous year in London in dealing with the difficulties of getting permits from the Ministry of Munitions and from the War Trade Department. If they were successful in getting a permit, then objections were raised to the export licences; and if they got both, then they had great difficulty very often in getting a ship. He had had some cases in which goods were here from a week before Christmas until the first week in April before they were shipped. He would also like to say that he had had occasion just recently to thank the Directors for a special recognition of his personal services in the past; and he now wished to make this acknowledgment before the proprietors.

The meeting closed with a vote of thanks to the Chairman.

CAPE TOWN AND DISTRICT GAS LIGHT AND COKE COMPANY.

A Substantial Improvement in the Financial Position.

The Ordinary General Meeting of the Company was held last Wednesday, at Egypt House, 36 to 38, New Broad Street, E.C.—Mr. J. E. LILLEY in the chair.

The SECRETARY (Mr. R. W. Blackburn) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

CIRCUMSTANCES, FAVOURABLE AND UNFAVOURABLE.

The CHAIRMAN, in formally moving the adoption of the report and accounts, said the shareholders would notice that the financial result of the year's trading was about £2600 better than that of the previous year. The past year had been marked by one favourable circumstance—that was, the increased demand for gas—and by one or two unfavourable circumstances. These were the difficulty of obtaining suitable coal and materials of all kinds, as well as the increase in wages. With regard to coal, there was plenty of it in the colony, and plenty of the kind that suited the Company very well. But all the suitable coal was at rather a long distance from their works; and it usually came to them either by sea or by rail. Coming by water was now entirely out of the question; and coming by rail was a matter of getting the convenience of railway trucks. The exigencies of war traffic made great demands on the railways; and the difficulties of obtaining transit of coal were so great that no collieries would enter into contracts for the delivery of coal to the Company during the year. They had, therefore, to get coal as they could, and such kinds as they could. Altogether, they used seven different kinds from seven different collieries. Very much of it was inferior in quality for their purposes, and so gave them comparatively bad results in regard to gas, coke, and tar. In addition to this, the coal cost more money. The difference in the price of coal at the end of the year from that at the beginning was 4s. 10d. per ton, which represented a considerable increase for the year. Fortunately, they had some stocks in hand at the beginning of the year—not so large as they wished now they had been; and as some of the coal purchased did not cost them the full advance, the average extra price for the year was about 1s. 11d. per ton—a fraction over perhaps; so they might call it roughly 2s. per ton. As he had said, the highest price paid during the year was 4s. 10d. per ton more than the average for 1916; and they also had to use 3474 tons more. The difference in the price per ton was by no means the measure of the difference in the cost of the coal on account of its inferior quality. Part of the 3474 tons was necessarily used in the provision of the larger quantity of gas that had to be made. As would be seen, they had to manufacture nearly 18 million cubic feet more gas. But this ought not to have required more than, at the very outside, about 1800 tons, whereas they had to carbonize an additional 3474 tons, because so much of the coal yielded a smaller quantity of gas per ton than the coal they ordinarily used. Nevertheless, they were able to keep up the supplies of gas. He ought perhaps in fairness to the coal to say that the retorts they had to bring into use to produce the extra quantity of gas were not anything like so productive as were the retorts they had been previously using; so that a portion of their manufacture was conducted uneconomically, as compared with their ordinary means of working, owing to the difficulties of getting the new retorts for which they were providing the money.

COUNTERBALANCING DISADVANTAGES.

There was something to counterbalance this extra cost and the disadvantages, because, if the shareholders looked at the revenue account, they would find that the sales of gas amounted to £5297 more than in the preceding year. A good deal of the extra gas they had sold had been for manufacturing and business purposes; and therefore had been sold at a special price. But the ordinary consumers had also used more than in the previous year. They could have had many more customers if they could have supplied them with meters, of which there was great difficulty in obtaining supplies at the present time. Residuals brought in £1894 more than in 1916. They ought to have given them very much more, because the extra quantity of coal used should have yielded more coke and tar than it did. But they could not get more out of the coal than there was in it; and so they had to be satisfied with the additional £1894. Taking the two items together, this was not a bad result. It more than compensated for the extra cost of coal and wages. Fittings brought in a little more profit—about £159. They were always pleased to see an increase in this item, because it showed there was a lively demand from their customers. Although never a big amount, it was one to which the Board attached some importance.

THE EXPENDITURE EXAMINED.

On the debit side of the revenue account, it would be seen that the cost of manufacture and distribution had cost £23,380, against £17,820—being an increase of £5560. It might be taken that roughly £5000 of this extra cost was for coal, and the balance chiefly wages. In repairs and maintenance, £689 more was spent than in the previous year. They had to keep the works in good order. Rather more money was spent than would have been the case otherwise owing to having to bring into use the old retorts, which they had hoped would never have had to be employed again. They had anticipated that before this they would have had additional new retorts. However, though comparatively uneconomical, the old retorts had served their purpose in producing the extra quantity of gas required. The next item in the account that deserved attention was that interest, discounts, allowances, &c., this year amounted to only £22, against £1104 the previous year. There were two or three reasons for this. One was that last year, included in the amount, was the cost of the rearrangement of their 6 p.ct. debentures; and they had to pay the commission on this transaction. Then they had not had to pay any interest on loans from the bankers or from other sources. Instead of this they had received interest on deposits they were able to make with their bankers from time to time when they had money which they did not immediately require. Altogether this accounted for the difference in the item. In the revenue account, they had also charged the interest for the debenture stocks, because the Board did not think they had any right to reckon as profit anything they were compelled to pay without any choice whatever in the matter. This was a debt they owed to the debenture holders; and the Directors did not think any profit should be reckoned until the debt was paid. Therefore they had placed the charge to revenue account. They did not want the profit to appear larger than it was; and though they thought it desirable these items should go to revenue account rather than to profit and loss account, it made no difference whatever to the actual expenditure. It did for this year make the comparison of profit transferred from the revenue account look unfavourable; but anyone who understood figures knew the result was really favourable. As compared with £25,556 transferred last year, the amount this year was £19,990. But if the debenture interest was not charged to revenue, the amount carried to profit and loss account would have been this year £28,157; so that it was evident at a glance the result had been more favourable.

PROFIT AND LOSS ACCOUNT—PAYING BACK PREFERENCE DIVIDENDS.

The £19,990 carried to profit and loss account was partially disposed of by paying a whole year's dividend, last November, on the preference shares; whereas the previous year they were only able to pay a half-year's dividend. For depreciation of the value of stocks, £914 had been written off, as against £2320; and having written off such a large sum last year, it was not necessary to write off so much this year. The Board had also transferred £3000 to reserve and contingency account. This, it would be noticed, represented (less £500) the amount of debentures redeemed during the year; and it now became a credit to the reserve account, and reduced the liability on the debenture account. They had also transferred £3000 to reserve for plant renewals, &c., which was done in order to provide new plant, which was very necessary as soon as it was possible to get it. This left a balance of £10,559 to be disposed of; and out of this it was proposed to pay £9000 dividend on the preference shares, which was equal to two years' dividend. Thus during the year they would have been able to pay three years' dividend on the preference shares, and so reducing their—he would not say overdue liabilities, but liabilities to the extent of two years in respect of the preference shares. He did not say "overdue" liabilities, because this was a matter that had been discussed lately in the financial world. Preference dividends were not due until they were earned. They were not a debt; and therefore they were not due in respect of one year if not earned in any one year. The amount which they represented became a debt against the ordinary shareholders; it became a prior claim over them which was deferred until it was earned. When the money was earned, then the preference dividend became due. The Directors were pleased indeed to have been able to reduce the amount which could be claimed by the preference shareholders by so much. This now left them about four-and-a-half years in arrear.

THE BALANCE-SHEET.

With regard to the balance-sheet, there was one item of special interest—that was, the investment account, which was up from £2307 to £9399; and this was all held in securities which were immediately realizable, and had been written-down to their values at the end of December last. On the other side of the balance-sheet, it would be seen that the 6 p.ct. debentures had been reduced from £20,500 to

£18,000. By the operation of their arrangements, they reduced them by £2500 a year.

THE COAL POSITION.

As to coal at the present time, he was pleased to tell the shareholders that they had been able to enter into a contract for all, or practically all, their supplies for the year. They hoped the coal would be of somewhat better quality than last year; but they had no certainty, because in South Africa, as in this country, coal was being delivered in a very dirty condition compared with ordinary times. What was being sold by collieries as coal now consisted largely of refuse matter, which was not ordinarily the case when conditions were different. Nevertheless, they had hopes that the coal would be of somewhat better quality this year. But this, of course, remained to be seen. Anyway they had a contract for the coal. He ought, however, to say that the contractors who had undertaken to supply the Company had hedged themselves round very well by protection against exigencies that might occur through the war; but he hoped these would not seriously affect the Company. The price would be about 4s. 10d. per ton more than at the beginning of last year, or something like 3s. more than the average of 1917. Although this was rather a heavy amount, the Directors thought it would not seriously hurt the Company, because they were fortunately doing an increased business.

NEW BUSINESS WAITING OWING TO THE LACK OF METERS.

With regard to the gas consumers, the Board were sorry to have to report that the number was smaller than in the previous year. This could not be helped. They had a waiting list of about 300 new customers at the present time. But it was all a question of meters. A careful scrutiny was made of all the customers; and wherever they found an opportunity, where a meter was given up, or where the consumption was so small as not to justify a meter being fixed, they had made use of the meter in another place where it could be more profitably utilized. They had also a large number of meters, which were brought in from time to time, waiting repair, which was carried out in their own workshops—the materials being obtained from this country. But now they could not get the parts with which to repair the meters. The Company had done their best to manufacture some of these parts in Cape Town; they had even made an attempt to produce their own diaphragms for the meters. In this they had met with some little success; but the difficulty of getting the skins with which the diaphragms were made had become very great. For some time past, they had been negotiating for supplies in this country; and they hoped to get permits from the Government to ship some as soon as obtainable. They had been able to send out some new meters during the year. These had been brought into use, and had been paid for out of revenue. The Board considered they were justified in charging all new meters to revenue because they were necessary to their business. No charges had been made to capital account during the year.

PREPARING FOR ADDITIONAL MODERN CARBONIZING PLANT.

Respecting the sale of gas, he was pleased to say that the increased demands continued. The sales were still better this year, so far as it had gone, than they were last year. They were putting an increase on an increase; and they could do a much larger business if they only had the meters. There was the difficulty, of course, that they could not supply more gas, except by bringing old retorts into use, which they had hoped never to have had to employ again. They had reconstructed them as best they could, because they could not run the risk of not having manufacturing plant for any additional business they could take up. All the expense of doing this was paid for out of revenue. Naturally they tried to make the old carbonizing plant a little better than it was before; but they could not make it anything so useful and economical as the newer kind of retorts. The new retorts were continuing to work excellently; and they satisfied every expectation they could possibly have formed of them. As to getting new carbonizing plant, as he had said they had £9000 ready for this purpose; and by the end of this year, they expected it would be £12,000. They thought this would be sufficient for all requirements for new retorts for some time to come; but from what they could learn, the estimate for providing new retorts would be more, owing to the price of material and labour. They would have to meet this expenditure as soon as they could get the retorts erected; and they would be compensated by the advantages. In conclusion, he said the prospects for this year were very satisfactory.

Mr. H. R. SAVORY seconded the motion, which was unanimously adopted.

Moved by Mr. SAVORY, seconded by Sir JAMES BRADFORD, J.P., Mr. C. W. Lilley was re-elected to the Board.

Mr. LILLEY, in his acknowledgment, remarked that, during the fourteen or fifteen years he had been a Director of the Company, he had seen it pass through a number of vicissitudes; and he now hoped they would soon reach a stage at which they might look for more normal and prosperous progress.

On the proposition of Mr. J. H. CLAYTON, seconded by Mr. A. G. SCRASE, the Auditors (Messrs. Kemp, Sons, Sendell, & Co.) were re-appointed at the same fees as before.

Moved by Mr. SCRASE, and seconded by Mr. CLAYTON, a hearty vote of thanks was passed to the Chairman and Directors, the London officers, and the staff and workmen in South Africa. The proposer remarked that the shareholders recognized that the staffs in London and Cape Town had had an unusually anxious time.

The CHAIRMAN, in his acknowledgment on behalf of his colleagues and himself, said the officials at the Cape would be very pleased to receive the message of thanks from the shareholders. Their officials had served them with loyalty for some years past. The Directors highly valued their services; but having received loyalty from them now for so many years, the Directors looked for it as a regular thing. He might instance the bad debts account. At one time it represented £1500 a year. Now the Board thought it ample if they reserved £150; and they knew in their own minds that this was more than

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would be necessary. They had adopted the system of having quarterly returns of all accounts that were three months overdue. They had pursued this plan for some few years; and instead of making large amounts of bad debts, they now made almost none—in fact, it was quite a negligible sum. This showed that their officials were doing their duty in this respect. And what they were doing in this, they were doing in other respects.

INCOME-TAX ALLOWANCE FOR DEPRECIATION OF PLANT.

An important decision as to the allowance for depreciation of plant under Schedule D of the Income-Tax Acts was given on the 27th ult. by the General Commissioners of Taxes at Chertsey.

A claim had been put forward by Messrs. Scott & Co. (Chartered Accountants), of Cannon Street, E.C., on behalf of a country water company for an allowance in respect of depreciation of their plant and machinery. Mr. W. A. Scott, who conducted the case before the Commissioners, claimed an allowance of 10 p.ct. on the written-down value of meters, 5 p.ct. on machinery and iron reservoirs, and 2 p.ct. on mains.

The Surveyor contended that, as renewals had been allowed as and when they occurred, there was no claim for depreciation as such; and he quoted the case of the "Caledonian Railway Company *v.* Banks" in support. He further argued that mains were not "plant" within the meaning of the Customs and Inland Revenue Act, 1878; also that, should the Commissioners allow "depreciation," the written-down value should be the prime cost, less depreciation at the rate approved by the Commissioners, although such depreciation had not, in fact, been allowed in past years.

After hearing Mr. Scott in reply, the Commissioners decided:

(1) That mains were "plant" within the meaning of the Act; but that for the purpose of arriving at their value, the cost of excavation should be deducted.

(2) That "written-down value" means original prime cost, *plus* subsequent additions (including renewals which have not been allowed for income-tax purposes), less all allowances actually granted for income-tax purposes in past years, in respect of depreciation.

(3) The rates to be allowed as follows: On mains, 2 p.ct.; on machinery, 5 p.ct.; on iron reservoirs, 5 p.ct.; and on meters, 10 p.ct.

The Town Council of the County Borough of Stoke-on-Trent at their last meeting unanimously decided to increase the salary of Mr. Alex. MacKay, their Chief Engineer and Manager, by £100 a year.

CALCUTTA PUBLIC LIGHTING CONTRACT.

It was decided by the Calcutta Corporation during last year that various matters in dispute between them and the Oriental Gas Company should be settled by arbitration. With regard to a deduction from the Company's claim on account of the defective illuminating power of the gas on certain dates in 1916, the parties arrived at a settlement that in future, when any test shows the gas to be below the minimum, the Company should be advised, and a joint test should be made on the same day at the Corporation laboratory. The Company were to pay a fine of Rs. 500.

Arbitration on other points* took place; and the award of the Arbitrators and Umpire was duly published. The award is that the Corporation are entitled to reduce the number of public lights to 9000; but all gas-lamps that are retained must be lit for not less than ten hours per night. The Umpire declared that the Corporation are not entitled to burn gas in any public lamp for part only of the night and to use electricity as an illuminant in lieu of the gas lamp or lamps for the remainder of the night, if by doing so any gas lamp is lit less than ten hours any night. If electric lighting is used for part of the night so that any gas-lamp is lit for less than ten hours during the night, the Corporation shall be liable to pay to the Company for the short-lit gas-lamps the same amount for gas as if the short-lit gas-lamps were burning gas for the minimum of 3650 burning hours per annum.

The Corporation are entitled to call for a plan in respect of the laying of all future pipes, and to insist that such pipes shall be laid in accordance with a plan previously approved by them. The Corporation must give notice of their intention to fill in, and of their having filled in, any excavation, or particular part of an excavation.

In consequence of the increased pressure which came into force on March 1, 1917, it was necessary to arrange for fresh tests of nipples to be carried out in the Corporation laboratory. The procedure adopted on all previous occasions has been to test the nipples lighted; and the Corporation contended that this should be continued. The Gas Company, however, objected to this method of test on the present occasion, and first asked that the nipples should be tested unlit. After much correspondence, they suggested that the tests should be made with the nipples fitted in the burners and the gas lit at the nozzles—*i.e.*, as actually in use in the street lamps. They also objected to thirty nipples being tested at one and the same time. The Arbitrators found that the meter used by the Corporation was not such an instrument as was prescribed by the agreement. The Umpire added: The method of testing nipples by lighting them is contrary to the provision of clause 37. The method of testing thirty nipples at a time is contrary to the provisions of the said clause. The Company have equal right of carrying out the test in their laboratory. With regard to the reference for directions as to the proper carrying out of the tests henceforth, the testing shall be

* See "JOURNAL," Vol. CXXXIX., p. 33.

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carried out on an apparatus of the description at present used by the Company. Thirty of each size of nipples shall be tested one at a time, and unlit. The test shall be carried out in turn at the Corporation laboratory and the Company's laboratory by testing one set of thirty nipples at the Corporation laboratory and the next set of thirty at the Company's laboratory, provided that unless and until the Corporation shall provide in their laboratory an instrument similar to that now used by the Company the tests shall be carried out at the Company's laboratory. All nipples to be tested shall be furnished by the Corporation. All tests shall be carried out jointly, provided that if either party fails to attend after one week's notice in writing of a test intended to be held, the party giving such notice shall be entitled to proceed with, and hold, the test *ex-parte*; and the result of such test shall be deemed to be correct.

In the Corporation it was stated that from their point of view the arbitration had not been altogether satisfactory.

TAR OILS FOR ENGINES.

At a recent meeting of the Diesel Engine Users' Association, notes were read by Mr. J. E. Edgecombe on tar-oil running with a four-cycle, four-cylinder, horizontal, 400 B.H.P. engine, driving a 20-ton flywheel-type alternator, with an output of 270 KW. at 2100 volts, single-phase. In a 120-hour run, the tar oil used was 6 tons 11 cwt., ignition oil 9 cwt., percentage of ignition oil to tar oil 6·87, and units generated 14,771. The consumption figure of the combined tar oil and ignition oil worked out at 1·07 lbs. per unit generated. Crude petroleum was used mostly for ignition oil; but kerosene had given satisfactory results. The average blast pressure was 750 lbs., at no time rising to 800 lbs. Gas oil had been used for ignition purposes; and it was found equally as satisfactory as either crude oil or kerosene. It was his practice to change over to fuel oil before shutting-down, and also to start-up on fuel oil. On one occasion, the engine was shut-down on tar oil; and no difficulty was experienced in starting-up again on tar oil. When overhauled, the flame-plates and pulverizers on all four lines were found in excellent condition, and showed no traces of choking-up.

Among the speakers in the subsequent discussion was Mr. J. M. Ferguson, who said that the various devices were in their experimental stage; and at the present time pilot-ignition formed the only reliable arrangement, and one which gave a greater latitude in the quantity of tar oil which might be used satisfactorily. The case for pilot-ignition had not been quite fairly stated; for no mention was made that tar oil might be used for ignition purposes down to about half-load, thereby reducing the quantity of crude oil required to a much lower figure, depending on load conditions. A further point which required attention was the improvement which resulted from warming the tar oil. Another speaker was Mr. H. Moore, who said that, after tests with some forty tar oils, he had come to the conclusion that the entire problem of ignition trouble was one of temperature; and, apart from the use of ignition-gear, it was therefore mainly dependent on compression. The chief difference between petroleum oils and tar oils was one of ignition-point. Ignition temperatures of petroleum oils were generally below 300° C.; while in the case of tar oils, they were in the region of 500° C. He had tested samples of tar oils which had been specially prepared, and found them to possess ignition-points below 350° C. Vertical retort tar oils were slightly lower in ignition-point than horizontal retort tar oils. In order to obtain good working and starting from "cold" on tar oils without ignition oil, and certainty of ignition with all tar oils, it was necessary to employ a compression pressure of 650 to 700 lbs. per sq. in. This necessitated higher blast pressures, and increased stresses to a very serious extent. With the above pressures, the wear on exhaust-valves was no greater than with petroleum oil, but uncertainty of ignition and increased stress were very detrimental to them. Pulverizer choking was generally encountered when burning oils rich in naphthalene; but it need not prove to be a serious trouble, and would be overcome by modifying the pulverizer design. Mr. P. H. Smith remarked that the most vitally important requirement, irrespective of running conditions or system applied to burn tar oil, was the pre-heating of the oil to about 80° Fahr., and feeding it to the engine at about this temperature. He disagreed with the previous speaker that compression pressures of the order of 650 to 700 lbs. were necessary to burn tar oil without pilot-ignition. The average pressures employed for any system appeared to be between 450 and 500 lbs. Mr. G. B. Vickers said his firm were pinning their faith on obtaining the best possible atomization of the fuel. The main idea to obtain this complete atomization seemed to be to offer as many sharp edges as possible where the blast air could impinge on the tar oil, splitting it up, as it tended to coalesce in passing through the flame-plate orifice.

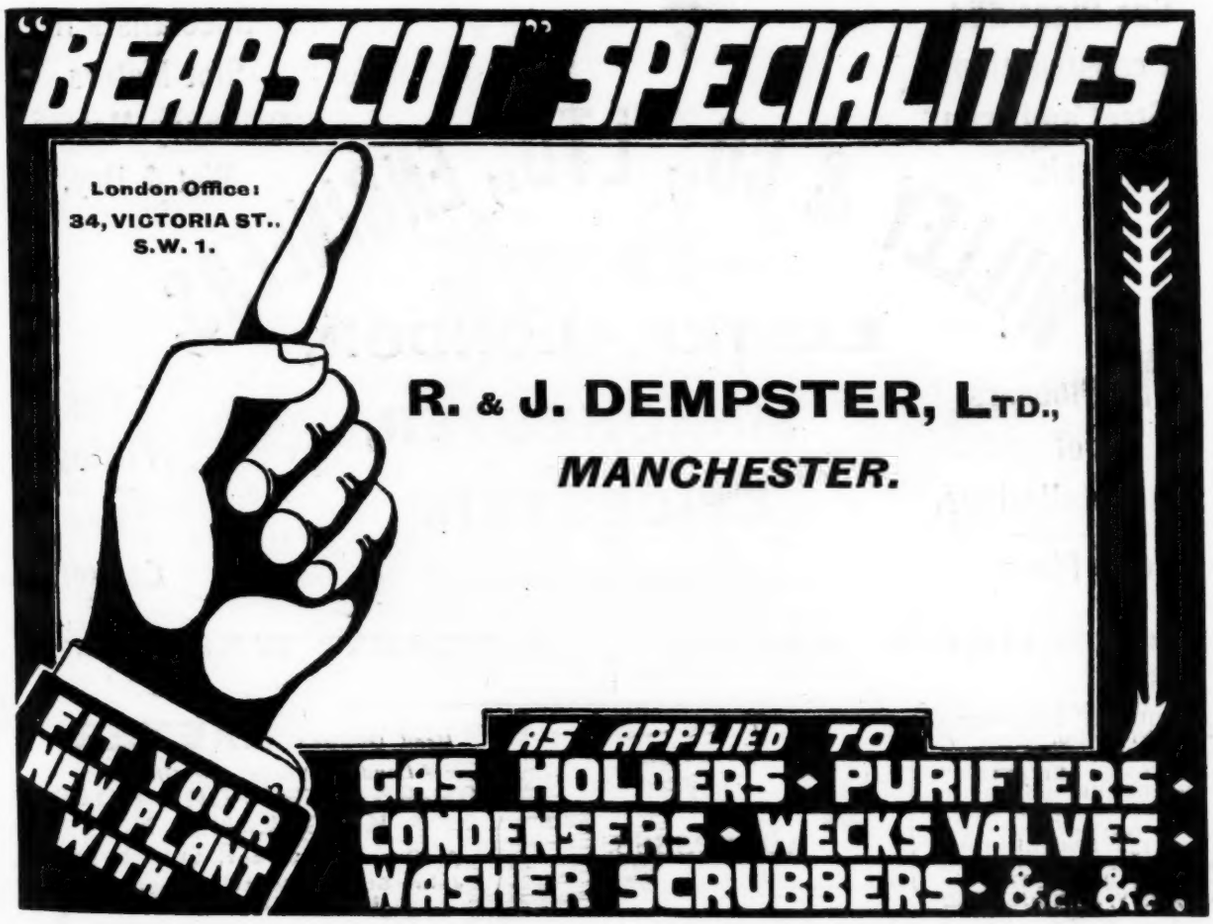
CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June* 3, 1918.

There are a fair number of inquiries for pitch, both for early and next season's delivery; and the market continues in a firm state, with the price not below 55s. per ton net in bulk at makers' works. Solvent naphtha is offered at about 4s. per gallon net, for 95/160 quality. Creosote and other tar oils are under control; and there is no change to record.

Available supplies of sulphate of ammonia are being readily taken up on the terms arranged by the Government. All other forms of ammonia are now brought under control by an order recently issued by the Ministry of Munitions.



Tar Products in the Provinces.

June 3.

The average values for gas-works products during the week were: Gas-works coal tar, 27s. 6d. to 31s. 6d. Pitch, East Coast 25s. to 30s. per ton; West Coast—Manchester 25s. to 30s., Liverpool 25s. to 30s., Clyde 25s. to 30s., nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. 9d. to 3s. 10d. Heavy naphtha, North, 2s. 9d. to 3s. 3d. Creosote, in bulk, North 4d. to 4¼d. Heavy oils, in bulk, North, 4½d. to 5d. Carbolic acid, 60 p.ct. East and West Coasts, 2s. 6d. to 2s. 9d. naked, nominal. Naphthalene salts, £5 to £6, bags included. Anthracene, "A" quality, 4d. to 6d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The volume of business does not show much expansion. Pitch remains a firm market; and business in London is put through on the basis of 55s. per ton f.o.b. Provincial quotations are firm, and rather less is heard of the proposal for a uniform price for pitch than was the case a few weeks back. It is realized that with the present extreme variations in quotations at different points it would be a very difficult matter to fix a uniform rate satisfactory to all. Manchester prices are again better. Fuel oils are in good demand; higher pitch qualities being specially sought for in the North. Tar still meets with good inquiries. Solvent naphtha remains at 3s. 9d. in the Provinces and 4s. 6d. in London, and makers are awaiting fresh restrictions with some degree of anxiety. Heavy naphtha continues at 3s. 3d. Naphthalene is rather uncertain for the time being. The absence of shipping facilities and the temporary difficulty of obtaining export licences have caused a lessening of demand for the refined; but the price remains about £30 per ton. Crudes continue at the usual wide range of from £5 10s. up to £12 10s. per ton for better qualities. Cresylic acid marks time. Benzol and toluol are rapidly absorbed as fast as produced, and makers are urged to increase outputs by all means in their power. Carbolic acid likewise goes into official consumption. Creosote presents some difficulties. The official price is 75s. per ton, which is equal to about 4⅛d. per gallon. No allowance is made for tank hire or railway carriage to the coast; the effect being that some firms have to purchase and take delivery in the Midlands, furnish tank-wagons, and transport it to the sea coast at their own expense, which is, of course, a serious matter when large quantities are involved. From 3¾d. to 4d. per gallon therefore is the approximate quotation in North and Midland districts. Aniline oil is still dull at 1s. 2d. per pound, and anthracene remains at 6d. per unit per cwt. The range of quotations is as follows:

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 32s. 6d. to 35s. Midlands 27s. to 29s.; North 28s. to 30s. per ton, *ex* works.

Pitch: London 52s. to 55s. f.o.b. works; East Coast, 33s. f.o.b.; West Coast, 31s. f.a.s.; Manchester, 30s.; Clyde 29s.; South Wales 42s.

Solvent Naphtha: Naked London 90-190% 4s. 6d.; North 3s. 9d. to 4s. per gallon; 90-160% naked London 4s. 3d. to 4s. 6d.; North 4s. to 4s. 3d. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6¼d. to 6½d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4⅛d. per gallon); heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

There is very little fresh in connection with sulphate. The new season prices are now in operation, and provide very little topic for discussion; makers settling down to new conditions satisfactorily. Interest is being maintained in the synthetic production of ammonia; and it is hoped that some idea of the cost of manufacture may soon be given to the trade. The plant is very expensive, and makers naturally want to know what to expect before going to the necessary capital outlay.

Record Sales in Glasgow.—Glasgow has achieved a record in the sale of gas, so far as the city is concerned. For the financial year closing on the 31st ult., the gross revenue from all branches of the Glasgow Corporation Gas Department attained the large total of £1,500,000. This is the highest revenue in the history of the department; the previous record having been £1,395,619, for the year ended May 31, 1917. But at that period the accounts showed a deficit in income as compared with expenditure of £21,917. This was attributed to advances in wages and increased cost of coal and other materials. To meet this deficit, a call was made on the surplus revenue account, leaving a balance at the credit of that account of £75,590.

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Gas and Coke as Fuel for Motor Vehicles.

In his Presidential Address to the Commercial Motor Users' Association, Colonel R. E. B. Crompton, C.B., dealt with the "Future of Heavy Motor Traffic." He remarked that, thanks very largely to the exertions of Mr. E. S. Shrapnell-Smith (who succeeds him as Chairman), the use of gas as a power agent for traction purposes has been made possible, and is steadily extending. Later on, when war conditions permit of the manufacture and supply of cylinders and compressing plant, the use of the gas-propelled vehicle will be greatly helped; and, in Colonel Crompton's opinion, it will become permanent, even for all the lighter classes of vehicles, and for short runs—such as for taxis and private carriages within or near towns. Owing, he proceeded, to the perseverance of men like Foden, Clarkson, and others, there are luckily on the road a great number of steam-vehicles which are deservedly favourites; and he had quite recently seen the development of a Clarkson steam-driven three-ton lorry in its latest form, which is a marvel of simplicity and good engineering design. A three-ton steam-driven omnibus or van on this system can be driven and attended to by one man, just as easily as if it was petrol-driven. The fuel is coke, the radius of action is sufficient, and the working cost per mile for fuel is just one-third of that of petrol at its present price. The Coal Controller states that now and for a long time to come—in fact, probably for all future time—there will be a greater supply of coke than ever before. This is the beneficial result of the more general distillation of coal to obtain the valuable bye-products for making explosives. Other manufacturers of steam-vehicles will be quick to avail themselves of Mr. Clarkson's valuable initiative; and the Coal Controller's wishes that people should address themselves to the use of coke fuel, will be largely and happily followed.

The Birmingham Corporation Gas Committee accounts for the year ended March 31 show a surplus of £30,757, to be paid over in aid of the borough rate.

Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., have received instructions from the Directors of the Aldershot Gas, Water, and District Lighting Company to issue £21,100 of 6 p.ct. redeemable mortgages, at par. The mortgages will be allotted in priority of application.

At the meeting of the Lancaster Corporation Gas Committee last Wednesday, the Engineer submitted a report for improvements to the chemical plant, at a cost of £5200, which is to be paid from the gas reserve fund. The tenders of the Chemical Engineering and Wilton's Patent Furnace Co. (amounting to £3205) were provisionally accepted.

The Wilputte Coke-Oven Corporation, of New York, have been awarded a contract for the construction of forty Wilputte ovens, with extensions to the existing bye-product plant and benzol plant, for the Citizens Gas Company of Indianapolis. Work has already been started, and the plant is expected to be in operation by December next.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for May 29.]

Nos. 8354—8708.

ANDERSON, W.—"Apparatus for production of oil fuel." No. 8409.
BELL, L.—"Apparatus for automatically indicating flow and pressure of gas or air." No. 8679.
CASBON, W.—"Atmospheric gas burners for heating." No. 8575.
DUNKINSON, A. J.—See Casbon. No. 8575.
HACKFORD, J. E.—"Treatment of coal, coal products, &c." No. 8470.
HELPS, G.—"Gas manufacture." No. 8569.
KERMODE, J. J.—"Burners for liquid or gaseous fuel." No. 8377.
MEREDITH, J.—"Convertible gas and coal domestic grate." No. 8369.
PEARSON & SON, S.—See Hackford. No. 8470.
PETERSON, J. M.—See Meredith. No. 8369.
REW, R. J.—"Carbonization of coal, &c." No. 8438.
ROLLASON, A.—"Utilization of atmospheric nitrogen in the manufacture of ammonia and other compounds." No. 8614.
RYDER, S.—"Fire-lighting by means of gas." No. 8615.
SCHROEDER, F. W.—"Incandescent gas-burners." No. 8579.
SMITH, J. S.—See Hackford. No. 8470.
THOMPSON, W. E.—"Gas-meters." No. 8678.
WALLINGTON, H. & S.—"Compressed-gas container." No. 8417.
WALSTER, J. & S.—"Generating coal gas in retorts." No. 8479.
WILLIAMS, J.—"Gas and electricity economizer." No. 8707.

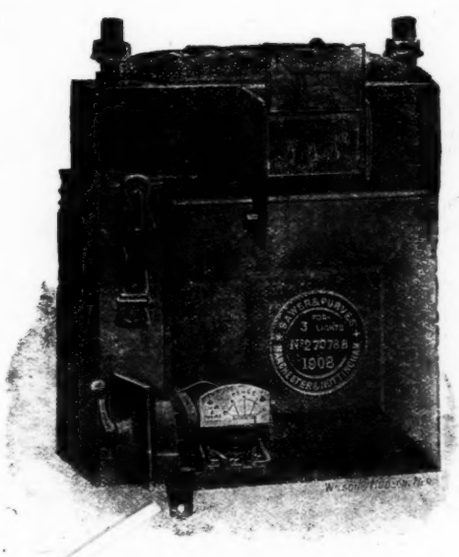
Bradford Gas Accounts.

At a meeting of the Bradford Gas Committee, on Friday, accounts were presented for the year ended March 31, showing a loss on the working of £31,710, as compared with a loss of £3736 in the previous year. There was now a total deficit on the undertaking of £52,500. The income from the sale of gas showed an increase of £10,300, which was accounted for by the higher price as from Jan. 1. There had been an increase of £19,400 in the revenue from residual products, including £9500 more from coke and £7500 from benzol. The revenue from benzol had been £12,400. The manufacture of the gas, including the cost of coal and wages, showed an increased expenditure of £48,500. A sum of £7700 allowances to dependants of employees with the forces involved an increase of £3200. The Committee resolved that the Corporation be recommended to approve a further advance in the price of gas, as from July 1, of 5d. per 1000 c.ft., bringing the charge to general users to 3s. 4d.

The Leeds Gas Committee have decided that a small general advance in gas prices must shortly be made; but the amount is not yet announced.

MILES PLATTING,
MANCHESTER.

SAWER
and
PURVES.
(BRANCH OF METERS, LTD.



PREPAYMENT
METERS.

RADFORD ROAD,
NOTTINGHAM.

AGENT FOR SCOTLAND
JNO. D. GIBSON,
2, Causeyside St.,
PAISLEY.

Gas-Works Results at Leek.

Reporting to the Lighting Committee on the financial position and the working results of the Leek Urban District Council gas undertaking for the year ended March 31, Mr. R. H. Ginman (the Engineer and Manager) says that the past year's working constitutes a record in every way in the history of the undertaking. The quantity of coal carbonized was 9700 tons, and the gas made 134,117,000 c.ft. The gas accounted for per ton of coal used was 12,933 c.ft.; the loss being 6·35 p.ct. The make per ton was 13,826 c.ft. For the preceding year, the figures were: Coal carbonized, 9850 tons; gas made 127,886,000 c.ft.; make per ton of coal, 12,983 c.ft.; accounted for per ton, 11,849 c.ft.; leakage, 8·83 p.ct. The gross profit of £4291 compares with £3364 in 1917, and the net profit of £1640 with £528. For both years the price of gas was 2s. 6d. per 1000 c.ft. A sum of £1000 goes in aid of the rates. Purification shows a profit of over 5d. per ton of coal carbonized. As to expenditure, coal and wages account for £1519 more than a year ago. In fact, there was an increase of £4168 in 1918 over 1914 in these two items. During the coming summer, Mr. Ginman hopes to be able to carry out an experiment in carbonizing which would have the effect of saving from 750 to 1000 tons of coal a year.

Tribunal Appeal at Todmorden.—At the Todmorden Tribunal, Harold Ashworth, clerk and works assistant in the Corporation Gas Department, age 35, married, Grade 1, appealed on domestic grounds. It was stated by the Town Clerk, however, that negotiations were pending with the Munitions Area Recruiting Office, as the applicant was in the position of Gas Manager when Mr. Barnes was away. It was understood that the papers had been sent to London for the case to be reconsidered. The situation of the department would be very awkward if this man had to go. He was granted to Aug. 1, open.

Dublin Gas Price and Quality.—Mr. E. H. Andrews, J.P. (the President), at a meeting of the Dublin Chamber of Commerce, referring to the petition of the Council against the Alliance and Dublin Consumers' Gas Company's Bill, said they were well aware that gas, like everything else in this critical time, was bound to increase in price; but there were several matters in the Bill that the Council could not agree with. It practically asked that the shareholders should be guaranteed a certain percentage on their shares, and did not take into consideration that, in guaranteeing this interest to them, nothing was provided to safeguard the public from the increase which would occur in matters of material and labour. He did not think the Chamber would object to pay a fair proportion of the increased price of production, if the gas supplied was of fair illuminating power.

STOCK MARKET REPORT.

THE Stock Exchange has exhibited great calm and remarkable strength during the past week. On Tuesday, there was very little doing; the general attitude being that of quiet expectation awaiting further intelligence of developments. It was a significant feature that our War Loans remained steady and unchanged, and the French 4 p.ct. loan actually made a slight advance. The same temperament, engendered of confidence in the future undismayed by the initial success of the enemy's attack, characterized the next day and the following day; and on Friday all the best things showed marked firmness.

The gilt-edged market, as partly indicated above, was in good case. The 5 p.ct. War Loan—always seemingly the most susceptible—had occasional movements, but closed firm. In Home Rails, the prior charges were in good request; but there was not much doing in the ordinaries. Canadians were somewhat irregular, but showed a firm front at the close. Argentines were still a prey to local tribulation, but wound up rather better.

The Foreign Market was remarkably firm. Both the 5 and the 4 p.ct. French loans advanced, and Japanese, Chinese, and Brazilian did well. In the Miscellaneous Market, Rubber was quite out of favour, and Oil languished almost up to the close. Shipping was easier, and Breweries irregular. Textiles and Iron and Steel were among the best.

Business in the Gas Market was on a fair scale when all the circumstances of the week are considered, though dealings did not extend to as many as a dozen undertakings; Gas Light and Coke and Imperial Continental appropriating most of it. The general tone was fairly good, though not uniformly so. In Gas Light issues, the ordinary was rather easier, and the quotation was lowered a point; but the rest were firm. Imperial Continental had a slight reaction from its previous free advance, and dropped a point. All Cape Town issues were put up, and the rest were mostly firm; but Primitiva shrank in face of the position revealed in the Directors' report.

The Money Market was easy.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 64, 64⅛, 64⅛, 64½, 64¾, Imperial Continental 89, 90, 90¼, South Metropolitan 65, South Suburban 69. On Tuesday, Gas Light ordinary 63, 63¾, 64, 64¼, ditto maximum 54⅛, ditto preference 68¾, 69¼, Imperial Continental 88, 89, 89⅛, 89¾, 90, 90¼, 90¾, Portsea "C" 77⅞, 78¼, Primitiva preference 53s., South Metropolitan 64⅝, 65, Tottenham "B" 68½. On Wednesday, Bombay 5⅛, British 30⅛, Gas Light ordinary 63½, 63¾, 63¾, 64, ditto maximum 54⅛, ditto preference 69, Imperial Continental 89, 89⅛, ditto debenture 66¾, Southampton 74⅛, Tottenham "B" 68, Monte Video 5 p.ct. debenture 81. On Thursday, British 30¼, Gas Light ordinary 64, 64⅛, ditto debenture 56, Imperial Continental 88, Oriental 101½, Primitiva 33s., 33s. 6d., ditto preference 53s., South Metropolitan 64⅛, 64⅜, 65, 65½, South Suburban 70½. On Friday, Bombay 5⅜, British debenture 66⅛, Gas Light ordinary 64⅛, ditto maximum 54, Imperial Continental 87½, ditto debenture 67¼, Primitiva 33s., 34s., ditto preference 54s.

The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When last Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55—60	..
1,551,868	"	April 8	2½	4½%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280,000	5	April 29	7½	8%†	Bombay, Ltd.	5⅞—6⅛	5⅛—5⅝	5⅛—5⅝
50,000	10	Feb. 26	16	18%	Bournemouth Gas and Water: 10 p.c.	29—30	21—26	..
883,110	10	"	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	10½—11	..
115,000	10	"	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	"	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	67—69	..
992,045	Stk.	Feb. 26	14	14%	Brentford A Consolid.	261—266	76—79	..
734,920	"	"	11	11%	Do. B New	204—209	70—73	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	79—84	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	63—65	..
217,380	"	Feb. 26	11	9%	Brighton & Hove Orig.	208—213	135—140	..
244,200	"	"	8	6%	Do. A Ord. Stk.	154—159	95—100	..
530,000	20	Mar. 26	12½	22/6	British	44—45	30—31	30½—30½
129,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	65—67	66½
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3½—4½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7½—8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,513,280	"	Feb. 12	5/9/4	41/4	Commercial 4 p.c. Stk.	106—108	64—66	..
560,000	"	"	5½	36/8	Do. 3½ p.c. do.	103—105	62—64	..
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	30—35	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	60—62	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	150—160	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,009,180	10	July 29	10	5/0	European, Ltd.	17½—18	7—8	..
16,298,975	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke: 4 p.c. Ord.	98—102	63—65	63—64⅜
2,600,000	"	"	3½	3½%	Gas Light and Coke: 3½ p.c. max.	76—79	53—55	54—54½
4,062,235	"	"	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	68—70	68⅜—69¼
4,674,850	"	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	55—57	56
130,000	"	"	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
258,740	"	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	37—39	46—51	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7—8*	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	115—125	..
181,000	Stk.	Mar. 12	7⅞	7%	Ilford A and C.	151—154	90—95	..
65,780	"	"	6⅜	5¾%	Do. B	115—118	70—75	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	63—66	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	87—90	87½—90⅜
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	66—68	66⅜—67½
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	89—87	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A B	211—213 / 146—148	82—84	..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅝—3⅞	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—99	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	7⅜—8½*	..
1,875,892	Stk.	July 29	4½	3½%	Newcastle&Gatsh'd Con.	98½—99½	69—71	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	63—64	..
55,940	10	Feb. 26	7/14/0	7/0	North Middlesex 7 p.c.	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	101—108	101½
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	10%	Portsea, Island B	128—131	82—87	..
100,000	50	"	12	9%	Do. C	118—121	72—77	77⅜—78½
52,000	50	"	10	7%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅜—1⅞	33/—34/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4¾—5	2⅜—2⅞	53/—54/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—78	..
—	—	—	—	4%	Do. " " 1911	..	..	..
846,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	57—62	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½—11	7½—7⅞	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47—49	40—43	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	228—224	..	..
209,984	"	"	10	10%	Sheffield B	222—224	174—177	..
528,500	"	"	10	10%	Sheffield C	220—222	..	..
90,000	10	May 28	9	6/-	South African	10½—11½	9—10	..
6,609,895	Stk.	Feb. 10	5/4/0	40/-	South Met. 4 p.c. Ord.	111—113	64—66	64⅛—65½
—	—	—	—	—	Do. Pref.	..	93—95	..
1,895,445	"	July 10	8	8%	Do. 3 p.c. Deb.	73½—74½	54—56	..
234,830	"	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	129—131	..
952,795	"	"	6	4½%	S'th Suburb'n Ord. 5 p.c.	114—116	69—72	69—70½
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	73—75	..
135,000	—	—	—	4½%	Do. West Kent	..	..	..
167,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	84—86	..
647,740	"	May 14	5	5%†	Southampton Ord.	99—102	74—76	74½
120,000	"	Feb. 12	7½	5⅝%	Tottenham A 5 p.c.	135—138	90—95	..
783,275	"	"	6	4%	Tottenham District B 3½ p.c.	115—117	67—69	68—68½
181,255	"	June 26	4	4%	Tottenham District 4 p.c. Deb.	87—89	62—64	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—8	1—3	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	99—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	87—88	..
80,000	"	Feb. 26	8⅜	67/6	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151—156	108—113	..
255,686	"	"	6⅞	52/6	Do. B 3½ p.c.	129—134	80—85	..
108,075	"	"	5/17/3	47/3	Do. C 3½ p.c.	110—115	80—85	..
859,000	"	"	6½	46/3	Wimbledon 5 p.c.	117—122	80—85	..
98,000	"	"	6⅝	52/6	Epsom 5 p.c.	121—126	80—85	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	49—52	..

* Ex. Div. † Next Dividend will be at this rate.